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# POISONING WITH A PREPARATION OF IRON, COPPER, AND MANGANESE

BY

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Most iron salts are relatively inert, and modern therapeutic practice recommends their use in full doses. Certain iron preparations are, however, apt to cause dyspepsia, and even one Blaud's pill may occasion abdominal discomfort in susceptible individuals. According to Goodman and Gilman (1943) iron salts used in the treatment of anaemias may cause "gastric distress, colicky pain, and diarrhoea. These complaints are more prominent after ferric salts than after ferrous salts, and more common with the soluble than the insoluble preparations." They consider that this is especially true of ferrous sulphate, owing, in part at least, to the smaller doses used.

Cases of poisoning due to the ingestion of iron are extremely rare. Smith and Cook (1934) mention a case of a girl who swallowed 1 oz. (28 g.) of ferrous sulphate and recovered. Nearly all the cases of poisoning by iron preparations are due to the tincture of perchloride of iron, but a case of iron encephalopathy has been reported by Hurst (1931) following the oral administration of huge doses of iron and ammonium citrate. He states that no other example of remote symptoms due to iron (other than local gastro-intestinal effects) has been reported.

Some experimental work has been done on iron poisoning, but for the most part the method of administration has been by injection. McGuigan (1926) quotes Kunkel to the effect that the fatal intravenous dose of iron for dogs is from 20 to 50 mg. per kg. of body weight. Meyer and Williams, according to McGuigan (1926), found that 0.6 g. of ferrous sulphate injected into the veins of a dog caused pronounced vomiting and diarrhoea; 8 g. given orally proved fatal to a dog in 26 hours, and the necropsy showed ecchymosis of the stomach and intestines. McGuigan also reports the death of a man following the ingestion of 45 ml. of tincture of iron.

Copper sulphate falls into the category of irritant metallic poisons. Acute poisoning with this substance is very rare, and fatal cases are still more uncommon. Consequently the fatal dose of this salt is unknown, but Smith and Cook (1934) advance the suggestion that doses of 1/2 oz. (14 g.) and upwards would act as powerful irritants on adults, and that a much smaller quantity would suffice to destroy infants or children. Copper sulphate is a powerful emetic, and may be used clinically for this purpose in doses of from 5 to 10 gr. (0.32 to 0.65 g.). If taken in larger quantities it causes acute gastro-enteritis. Because of its irritant properties, if this salt is given as an emetic and fails to act the stomach must be promptly emptied by some other means (Douthwaite, 1931). Retained copper is absorbed from the intestine and passes to the liver, where it is stored. It is excreted partly in the bile and partly in the urine.

The irritant properties of copper sulphate are to some extent an asset. On ingestion vomiting occurs promptly and diarrhoea follows later. These processes aid in eliminating the poison from the system, so preventing absorption and reducing the risk of remote toxic effects on other organs. It has been observed (Smith and Cook, 1934) that in non-fatal cases jaundice is sometimes a symptom, and this indicates that copper salts are apt to lead to liver damage. A considerable volume of experimental work has been done on this problem in the form of animal feeding experiments. Mallory, Parker, and Nye (1921) announced that it was possible to produce pigmentation and cirrhosis of the liver in rabbits and sheep by the oral administration of copper salts or of metallic copper in powdered form. Their results have been confirmed by Hall and Butt (1928), and denied by Flinn and Von Glahn (1929) and by Polson (1929), who claim that copper does not produce either pigmentation or cirrhosis, and that the pigmentation seen by Mallory and his co-workers is a natural phenomenon in the rabbit and is due to diet only. More recently Mallory and Parker (1931) have repeated their experiments and have found that copper given by injection in sufficient doses will kill a rabbit in from 24 hours to two to three weeks, and that necrosis and pigmentation of the liver cells can be demonstrated histologically. They assert that by special staining methods they have succeeded in demonstrating the copper in the liver cells. If the rabbits survive for a variable period, cirrhosis of the liver follows. They also describe the occurrence of necrosis of the tubular epithelium of the kidneys. Their results are supported by Hall and MacKay (1931), who found that 50% of their copper-fed rabbits developed cirrhosis of the liver, and that large quantities of copper were stored in this organ. Indirect support is also given by the finding of Gordon and Rabinowitch (1933) that in cirrhosis of the liver in man the copper content is increased. Thus there seems to be some evidence that copper salts can produce liver damage in addition to the gastro-intestinal irritation admitted by all toxicologists.

Manganese is generally regarded as being a relatively non-toxic element. A search of the literature has failed to reveal a case of acute manganese poisoning in man. There are, however, reports of chronic poisoning of industrial origin where the symptoms are those of hepatolenticular degeneration. The neurological syndrome resembles in some respects that characteristic of Parkinson's disease (Goodman and Gilman, 1943). Von Oettingen (1935) reports that the lesions of the liver and central nervous system seen clinically can be produced in animals with toxic amounts of manganese, while Hurst and Hurst (1928) failed to detect any changes in the brain even in

the presence of gross damage to the liver. A single large dose of a manganese salt given subcutaneously will prove fatal in one to two days, while smaller doses repeated will produce cirrhotic changes in weeks or months; similar changes are found in rats which have had manganous chloride added to the diet (Findlay, 1924). Hurst and Hurst (1928) also produced acute and chronic changes after giving injections of manganese. It is fairly clear that both acute and chronic damage closely allied to acute yellow atrophy and cirrhosis, as seen in man, can be produced in animals experimentally.

It is questionable whether these experiments have proved the toxicity of manganese under ordinary conditions in man. According to Richards (1930) the bulk of the evidence seems to show that when ingested, even in fairly large amounts, manganese compounds have no toxic effects. He quotes the work of Reiman and Minot (1920) and of von Oettingen and Sollman to prove that feeding manganese ores to dogs and pigeons over a long period and in large amounts fails to produce any significant changes in the manganese content of the blood and tissues or any pathological symptoms. Richards fed manganese to pigs and found no toxic symptoms after the daily ingestion of 3.5 g. of manganese citrate for nearly nine months.

### Case 1

A healthy boy aged 3 years 3 months took a box of tablets off the kitchen table in his home at 12 noon on April 23, 1946. According to the mother's estimate the box contained about 50 tablets. At 12.30 p.m. the same day the box was found to be empty, and the child admitted having swallowed all the tablets. Each tablet contained ferrous sulphate exsic. 3 gr. (0.2 g.), copper sulphate 1/25 gr. (2.6 mg.), and manganese sulphate 1/25 gr. Shortly afterwards the boy vomited and a few tablets were returned. During the afternoon of that day the child slept fitfully, was thirsty, and appeared to be very weak. At 6 p.m. he vomited again, and the vomitus was clear fluid only. He had a fairly comfortable night, and next morning his general condition had improved. On the following day he showed no symptoms likely to cause alarm till 10 a.m., when his skin became yellow, his pupils dilated, and he was very restless. The child's condition steadily deteriorated till 5.30 p.m. on April 25, when he died—53 hours after taking the tablets. Medical advice was sought by the boy's mother immediately she discovered what he had done, but no treatment was considered necessary in view of the fact that he had vomited. Actually he was not seen by a doctor till 48 hours afterwards and he had no treatment during the illness.

*Post-mortem Examination.*—The only significant external findings were a suggestion of jaundice in the sclerotics and some abdominal distension. The stomach contained 3 oz. (75 g.) of dark coffee-ground material and the mucous membrane along the lesser curvature was brown and necrotic. The remainder of the mucosa was rather oedematous but not acutely inflamed. The anterior wall of the stomach was stained blue and the subperitoneal vessels were injected. The small bowel was filled with black semi-solid material which had stained the rather oedematous mucous membrane, and there was vascular engorgement here also. The large bowel was healthy, but contained hard black masses of constipated faeces. The liver looked about normal in size, weighed 510 g., was not unduly flabby, and there was no pronounced wrinkling of the capsule. Both on the surface and on section this organ was in part bright yellow and in part reddish purple. The distribution of these areas was irregular and the normal liver markings had disappeared. The spleen was slightly enlarged, and there was a very small quantity of blood-stained fluid in the peritoneal cavity. The kidneys were in a state of advanced cloudy swelling, and in the pelvis of each there was a small quantity of bright-yellow crystalline material. The bladder contained 1/2 oz. (14 ml.) of cloudy urine which was not grossly bile-stained. The only abnormalities noted in the respiratory system were a few haemorrhages, each about 1/4 in. (0.6 cm.) in diameter, at the lung roots and some thick mucus in the bronchi. The heart muscle was pale and there were two small subendocardial haemorrhages on the posterior wall of the left ventricle. Further haemorrhages, similar to those seen on the lungs, were noted at the lower pole of the thymus and along the descending thoracic aorta. All the other organs were normal.

*Histology.*—The liver showed degenerative changes ranging from cloudy swelling to complete necrosis. Some of the liver lobules had entirely disappeared, while in others the central cells still remained. Where the liver cells had vanished the capillaries were widely dilated and there were extensive areas of haemorrhage. General "polymorph" infiltration was in evidence, and deposits of granular pigment were scattered about. There was necrosis of the gastric mucosa to varying depths. Throughout the stomach wall the vessels were intensely engorged and there were haemorrhages between the muscle layers. The submucous layer was infiltrated with "polymorphs," and in places there were minute abscesses. The tubules of the kidneys and the heart muscle showed cloudy swelling. The lungs were acutely congested and there was some oedema. Desquamated epithelium and red cells were present in the bronchi.

*Chemical Analysis.*—The liver and the bowel and its contents were wet-ashed with nitric and sulphuric acids. The copper in the residue was determined polarographically, using a Tinsley recording polarograph, with the following results: liver 11.2 mg., bowel 5 mg. The manganese was determined by converting it to permanganate ion and measuring the absorption in a Hilger-Spekker absorptiometer. The following results were obtained: liver, 4.2 mg.; bowel, 8 mg.

### Case 2

At 7.15 p.m. on Sept. 9, 1946, a 1-year-old boy swallowed a quantity of the same proprietary preparation as in Case 1. It is estimated that he took between 30 and 35 tablets. The mother at once gave him salt and water, and when this failed to produce emesis she inserted her fingers into his throat and he vomited undigested food and a number of the tablets. Shortly afterwards the boy returned some brown material, and within an hour fresh and clotted blood. The child was admitted to hospital 90 minutes after taking the tablets.

On admission he was pale, collapsed, and shocked, with laboured, noisy, moist, and bubbly breathing. The pulse was thin and rapid, the rate being 170 a minute. There were dark-brown stains on his mouth resembling dried altered blood. The percussion note of his chest was unimpaired and moist breath sounds were heard at all areas. All other systems appeared to be normal. On admission to the ward the child started retching and when held up by his feet he vomited about 1 oz. (28 ml.) of fresh bright-red blood mixed with mucus. Immediate treatment was given to counteract the shock, warmth being applied externally. Gastric lavage was considered to be contraindicated, and bland fluids were given in the shape of milk and iced water. His general condition improved, and after a minim (0.06 ml.) of nepenthe at 10.15 p.m. he went to sleep. Four hours after admission the child again collapsed and appeared *in extremis*. The only positive findings were moist sounds in the chest and indications that the bronchial tree was full of fluid—presumably aspirated vomit. Intranasal oxygen was given, with slight improvement. The tablets in question were found to be radio-opaque, and the neck, chest, and abdomen were radiographed to determine whether any tablets could be seen in the stomach, bowel, or respiratory passages. None was observed. Atropine 1/150 gr. (0.43 mg.) was given at 4.5 a.m. on Sept. 10 and the child seemed slightly improved, but during the forenoon his temperature rose to 103° F. (39.4° C.). On the ground that an aspiration pneumonia was developing, a course of penicillin was started at 12 noon, with the result that the temperature began to fall. During the day there was one bowel action, the stool being very dark brown and offensive. At 6 p.m. the child again collapsed and vomited a small quantity of reddish-brown fluid. He was placed in an oxygen tent, but he died at 1.30 a.m. on Sept. 11—that is, about 30 hours after taking the tablets.

*Post-mortem Examination.*—This was carried out 34 hours after death. There was no jaundice. The only positive finding externally was the presence of a blotchy rash on the abdominal wall. The trachea and bronchi were filled with thick greenish

fluid which, from its colour, obviously contained some of the pigmented coating of the tablets. Both lungs were congested, and in them there were areas of collapse and a few scattered small haemorrhages. There were a few areas of pneumonic consolidation in the lower lobe of the right lung. The stomach was empty. Under the peritoneum covering it some haemorrhages could be seen. The lining of the stomach was brown, due to necrosis of the mucous membrane. The small bowel was normal, apart from an occasional area where the vessels were engorged. The large bowel was healthy and the contents of the bowel were stained black. The liver weighed 354 g. and its capsule was smooth. The liver tissue was yellow, but there were no haemorrhagic areas. Cloudy swelling of the kidneys was present. The urine contained no bile and no leucine or tyrosine crystals. The other organs were free from abnormality.

*Histology.*—The liver showed cloudy swelling and some fatty degeneration, but no necrosis. The gastric mucosa was necrotic to various depths, and much of the necrotic lining had been shed. The whole wall was intensely congested and there were extensive areas of haemorrhage in all its layers. In the submucous layer accumulations of "polymorphs" could be seen. The sections of the lung showed a typical bronchopneumonia. Cloudy swelling of the pancreas and kidneys was noted.

*Chemical Analysis.*—The liver and the bowel and its contents were analysed by the same method as was used in Case 1, with the following results: copper in liver, 2.88 mg.; in bowel, 4.58 mg.; manganese in liver, 1.375 mg.; in bowel, 3.56 mg.

## Comment on Analysis

Quite a number of estimations of the normal copper content of the liver have been made, and a few of those published have been summarized in Table I. Many of the

TABLE I.—*Normal Copper Content of Liver*

| Authority | Age | Copper per kg. of Liver | |
|---|---|---|---|
| | | Fresh | Dry |
| | | mg. | mg. |
| Sheldon and Ramage (1931) | Foetus | (37·5) | 150 |
| | Adult | (11·2) | 45 |
| Lesné, Zizine, and Briskas (1936) | Infants under 2 years | 14·0 | — |
| | Children 2–14 years | 11·5 | — |
| Cunningham (1931) | Adult | (6·2) | 24·9 |
| Brückmann and Zondek (1939) | Infants to 6 weeks | (57·5) | 230 |
| | Adults | (8·65) | 34·6 |
| Cited by Brückmann and Zondek: | | | |
| Ramage *et al.* (1933) | Infants to 7 weeks | (66·2) | 265 |
| | Children 3–12 years | (15·0) | 60 |
| Kleinmann and Klinke (1930) | Adults | (6·9) | 27·5 |
| Herkel (1930) | ,, | (6·4) | 25·4 |
| Tompsett (1935) | ,, | (5·5) | 22·0 |
| Morrison and Nash (1930) | Children 3–12 years | 9·03 | — |
| | Infants to 2 years | 24·0 | — |
| | Adults | 5·86 | — |

figures are given in terms of milligrams of copper per kilogram of dried tissue. The human liver contains approximately 75% of water (Gordon and Rabinowitch, 1933), and on this basis the figures quoted for dry tissue have been converted to milligrams of copper per kilogram of fresh liver. These figures are shown in parenthesis in Table I. It is at once apparent that there is a considerable variability in the results. This is due to two factors. First, the series of estimations was in most cases too short to strike a reliable average, as in any biological variable there is considerable deviation on either side of the mean; and, secondly, the copper content of the foetal and infant liver is considerably in excess of that of the adult (Sheldon and Ramage, 1931). From the figures quoted the average for infants up to 2 years is 40.4 mg. per kg. of fresh liver; for children from 2 to 14 years, 11.8 mg. per kg.; and for adults 7.2 mg. per kg.

In Table II some estimations of the manganese content of the liver are quoted. It seems that this element is present in fairly constant amounts, and that there is no storage in infancy (Brückmann and Zondek, 1939). The average content per kilogram of fresh liver is 1.8 mg.

TABLE II.—*Normal Manganese Content of Liver*

| Authority | Manganese per kg. of Liver | |
|---|---|---|
| | Fresh | Dry |
| Brückmann and Zondek (1939) | (1·75 mg.) | 7·0 mg. |
| Cited by Brückmann and Zondek: | | |
| Ramage *et al.* (1933) | (2·1 mg.) | 8·4 mg. |
| Richards (1930) | 1·75 mg. | — |
| Reiman and Minot (1920) | 1·70 mg. | — |

Table III shows the content of manganese and copper per kilogram of fresh liver in the two cases under consideration. There seems to be no parallel between the

TABLE III.—*Manganese and Copper Content of Liver in Cases 1 and 2*

| | Liver Weight | Copper per kg. of Liver | Manganese per kg. of Liver |
|---|---|---|---|
| Case 1 | 510 g. | 21·9 mg. | 8·2 mg. |
| ,, 2 | 354 g. | 8·1 mg. | 3·9 mg. |

two. In Case 1 the liver contains about twice the amount of copper expected, and in Case 2 only a fifth of the normal average. In Case 1 the manganese in the liver is over four times the normal, while in Case 2 it is only twice. No reasonable conclusions regarding the passage of the absorbed copper to the liver can be drawn, because of the relatively small amounts ingested and the variability in the normal content in young children. In both instances the manganese content was substantially increased, which suggests that, as the basic figure is more constant, this element tends to pass to the liver.

## Animal Experiments

In order to determine with certainty which of the ingredients of the preparation in question was responsible for the death of these two children, a number of animal feeding experiments were undertaken. Guinea-pigs and cats were used. In the first instance six pairs of guinea-pigs were treated with the tablets. One pair served as controls and were given 6 ml. of water only. The remainder were dealt with in pairs with 5, 4, 3, 2, and 1 tablet respectively. Those given two tablets at 3 p.m. one day were all found dead next day at 9.30 a.m. The post-mortem findings were similar in all cases. The stomach showed a bluish-green patch on the greater curvature, and was distended with granular coffee-ground material heavily stained with fresh blood. The mucosa was brown and necrotic, and patches of it had been shed. Haemorrhages could be seen with the naked eye in the stomach wall. The upper part of the small bowel was injected and the contents were blood-stained. The large bowel and its contents were normal, and the animals did not suffer from diarrhoea. The liver appeared normal and no abnormalities, apart from occasional haemorrhages on the lungs and pericardium, were noted elsewhere.

Histological examination of the stomach showed necrosis of the mucous membrane to varying depths, with detachment of the more superficial layers. The vessels were engorged and haemorrhages could be seen in the submucous and muscular layers. "Polymorph" infiltration of the submucosa was noted. No wholesale necrosis was seen in the sections of the liver, the commonest appearance being cloudy swelling. Some vacuolation of the cells was not uncommon, and this was more in evidence in those animals given the larger doses. Here the cytoplasm appeared granular and fragmentary, and sometimes the cell contained a nucleus isolated in a large vacuole surrounded by an intact cell membrane. These areas were irregularly scattered and did not bear any special relation to the portal canals. "Polymorph" accumulations in the liver sinuses were not uncommon, but the groups usually

amounted to no more than a half-dozen cells. No significant histological changes were observed in any of the other tissues.

The two controls and the two guinea-pigs given one tablet each remained apparently unaffected. One control and one of the other animals died later from bronchopneumonia. All four animals were dissected, and no abnormality was discovered in the gastro-intestinal tract.

Two cats were each given five tablets, and within a short time they became ill and vomited blood. One of the cats was killed 4¼ hours later. The other cat survived but was ill for several days. It refused food, had no energy, and its coat was ragged. It had apparently completely recovered 18 days later when it was destroyed. The post-mortem examination of the first cat revealed naked-eye and microscopical changes in the stomach identical with those found in the guinea-pigs. All the other organs, including the liver, were normal. The second cat appeared to be perfectly healthy at necropsy, and there was no histological abnormality of the stomach. Sections of the liver, however, showed changes similar to those seen in the guinea-pigs given the heavier dosage. Many areas looked healthy, while in others the cells were in various stages of degeneration up to complete necrosis. There were no large areas of necrosis, but rather small nests of cells here and there surrounded by healthy liver tissue. No regenerative processes were seen.

At this stage of the investigation it was apparent that when a certain dose of this preparation was exceeded it was relatively lethal to cats and guinea-pigs. To determine which ingredient was the noxious one, it was decided to administer them separately to a further batch of animals. To begin with, ferrous sulphate was used alone. This was given to four pairs of guinea-pigs in doses of 3 gr. (0.2 g.) each to the first pair, 6 gr. (0.4 g.) to the second, 9 gr. (0.6 g.) to the third, and 12 gr. (0.8 g.) to the fourth. One of the guinea-pigs given 3 gr. died in 5 hours, the other survived, as did the pair given 6 gr., while those given 9 and 12 gr. died overnight. The post-mortem findings were identical to those observed in the guinea-pigs previously treated with the proprietary tablets. The animal killed by 3 gr. of ferrous sulphate weighed only 210 g. while its mate weighed 445 g.; the pair given 6 gr. weighed 675 and 770 g. On considering those guinea-pigs killed by the smaller doses we find that, on an average, 1 gr. (0.065 g.) of ferrous sulphate per 64 g. body weight will prove fatal (Table IV).

TABLE IV

| Weight of Guinea-pig | Dose of Ferrous Sulphate | Guinea-pig Weight per Grain of Ferrous Sulphate |
|---|---|---|
| 416 g. | 6 gr. (0·4 g.) | 69 g. |
| 355 g. | 6 gr. (0·4 g.) | 59 g. |
| 210 g. | 3 gr. (0·2 g.) | 70 g. |
| 535 g. | 9 gr. (0·6 g.) | 60 g. |
| 560 g. | 9 gr. (0·6 g.) | 62 g. |
| | Mean: | 64 |

The fact that the ferrous sulphate alone had the same effect and produced pathological changes identical with those occasioned by the proprietary tablets suggests strongly that the iron salt is the noxious ingredient. It was therefore decided to give six fresh guinea-pigs manganese sulphate and copper sulphate together. The proprietary tablets contain 1/75 gr. (0.87 mg.) of these salts for each grain of ferrous sulphate, and it was found that about 1 gr. of ferrous sulphate per 64 g. body weight of guinea-pig would prove fatal. The first pair were given 1/75 gr. of the manganese and copper salts per 64 g. body weight, the second pair double that amount, and the third pair a triple dose. This treatment had no effect of any sort on the guinea-pigs. It would appear, therefore, that the two children and the experimental animals died from acute ferrous sulphate poisoning.

## Conclusions

The proprietary preparation in question is widely used therapeutically and is generally regarded as being quite innocuous. This may be true in ordinary doses, but the two cases described and the results of the animal experiments clearly show that in very large doses this preparation may be highly dangerous. It is clear that these are cases of acute ferrous sulphate poisoning. This salt, in contact with the gastric juice, would be converted into the chloride, which has a considerable irritant action. This accounts for the acute haemorrhagic gastritis found in the two children and in the animals. The remarkable feature of Case 1 was the extreme liver damage found. We failed to produce comparable lesions in the experimental animals. Of course, in their case death occurred quickly, while the elder boy lived for 53 hours after taking the tablets. This allowed time for considerable toxic absorption from the damaged tissues of the stomach, and this alone may have been sufficient to produce the degree of liver destruction found. The younger boy lived for 30 hours, and in his case the liver damage was not nearly so great. He died from an aspiration pneumonia, and had he not contracted this he might well have recovered. The quantities of copper and manganese taken were too minute to have any toxic effect.

## Summary

The toxicology of the salts of iron, copper, and manganese is briefly reviewed.

Two cases of fatal acute poisoning due to a proprietary preparation containing ferrous sulphate, manganese sulphate, and copper sulphate are described.

The results of a chemical analysis of the liver and of the bowel and its contents are given in each case.

A short series of animal feeding experiments is described, proving that the ferrous sulphate is the noxious ingredient in the preparation concerned.

I have pleasure in acknowledging the help I have received in this investigation. Mr. R. Belcher and Mr. G. W. C. Milner, of the Department of Fuel Technology of Sheffield University, very kindly performed the chemical analysis of the organs. Dr. Beryl Smith, a resident physician at the Children's Hospital, Sheffield, provided me with the clinical report on Case 2. Dr. I. F. S. Mackay, Lecturer in Physiology at Sheffield University, undertook the feeding of the experimental animals. To these colleagues I am deeply indebted for their kindness and willing co-operation.

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# AN OUTBREAK OF DIPHTHERIA IN A HIGHLY IMMUNIZED COMMUNITY

BY

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The outbreak described below is considered worthy of record because methods of immunization against diphtheria and of maintenance of the immunized state are still in the developmental stage, and anything which can throw light on the efficiency of our present methods is of value. One important point about which there still seems to be some disagreement is the value of the Schick test in the field as an indication of immunity. The amount of circulating antitoxin in the blood is considered to be a more accurate indication, but this investigation is impracticable for general application. The real measure of protection against diphtheria would probably be regarded as the rapidity and degree of response of the protective body mechanism to the toxins of the organism, it having already been sensitized by previous immunizing injections.

It is clear that immunization by generally accepted methods does not in every case necessarily protect from a sharp attack of diphtheria. It is also clear that diphtheria of at least moderate severity can occur in a Schick-negative person. In this event it could not be guaranteed that death would not occur if circumstances were unfavourable. The chief points brought out in the present outbreak are: (1) The possibility of an alarming outbreak of diphtheria in a highly immunized community (94% previously immunized; 80% Schick-negative). (2) The failure of previous immunization to protect against a severe attack in certain cases. (3) The occurrence of a high proportion of cases among Schick-negative reactors.

## Description of Outbreak

The institution under consideration is a modern private day school for girls of all ages, run on up-to-date lines with good hygienic facilities. The buildings are airy, on two floors, and there is no overcrowding. The children come from a number of adjoining districts. The school has three divisions—senior, junior, and infants. Among the infants are a few small boys. The three divisions are mainly separate, but there is a small amount of mixing between the senior and junior schools in the main building. The infants' department is situated in a separate building which was formerly used for residential purposes, and, with the exception of a few children who stay for midday lunch, the infants do not mix with the other divisions. Dinners are not provided at the school, but about 20% of the children bring midday lunch and mix in one room during the lunch hour. The approximate numbers in the divisions are: seniors, 160; juniors, 70; infants, 100. The teaching staff numbers 15.

## First Phase

The school was closed for half-term holiday from March 1 to 5 inclusive. On the 3rd information was received from an adjoining district that a child (Case 2) attending the senior school had been removed to hospital with diphtheria. Owing to the school being closed it was not possible to inspect the children in school, but a list of class contacts was obtained and the names were telephoned to the various districts on the same day. As a result of this information two more cases (Case 1 and Case 4) from the same class were discovered in an adjoining area. As soon as the school was reopened on March 6 all the children were inspected and swabs were taken from class contacts and from any children showing the slightest suspicion of a pathological condition in the nose or throat. The number of children swabbed amounted to about 10% of those attending school, and all these results were negative. On this and ensuing days lists were prepared of children absent from school, and these were circulated to the medical officers of health of the districts where the children lived. This proved a very useful measure in the recognition of doubtful or missed cases.

The position on March 6 was that all the children attending school were well, and so far as was known they had not been in contact with a possible case for six days. In view of the fact that the great majority of the children (94%) gave a history of immunization, there appeared to be no urgent need for anything but continued observation at this stage.

In the meantime home inquiries brought to light several other pupils who had sickened during the holidays. The total number of cases belonging to this phase was eight (see Table I). Seven of these were senior girls and one was a junior girl. The infants' school was not affected. Seven of the cases became ill during the holiday week-end between Feb. 27 and March 3. One of the cases (Case 1) developed what was apparently a mild tonsillitis on Feb. 22, and this was followed by heavy nasal diphtheritic infection. This was the first case in point of time.

## Second Phase

On Sunday, March 24, notice was received that a further case of diphtheria (Case 9) had occurred in one of the senior classes (Form IV) which had been involved in the previous outbreak. The date of onset in this case was given as March 22. This was 22 days after any of the previous cases had attended school. On March 25 a case (No. 10) was reported from another senior class (Form III) which had been previously affected. On the same day the whole school was inspected and Schick testing was carried out in the two classes involved. In the meantime arrangements were made to obtain the parents' consent for Schick testing and combined active and passive immunization where considered necessary for the whole school.

On March 26, with the exception of six objectors, the whole of the remaining school-children and staff were Schick-tested. Controls were used for the staff only. The intention was to give combined active and passive immunization to Schick-positives only, but as it was not considered justifiable to wait longer than 24 hours before adopting this treatment an early reading was taken, and this meant the inclusion of a considerable number of children with doubtful reactions among those who received immunization. Fifty-three per cent. of the children had this treatment, which consisted of the injection of 0.3 ml. of A.P.T. into the deltoid in the left arm and 500 units of diphtheria antitoxin similarly into the right arm. Six Schick-positive members of the staff were given 1 ml. of T.A.F. instead of A.P.T. A Schick reading of the children after an interval of five days showed that actually only 20% were positive.

During the ensuing days throat and nasal swabs were taken from the whole school, including staff. On March 26 four more children went down, two of whom were in the junior school, but the infants' division was clear. The total number of carriers found without symptoms or signs was eight. Five children had positive throats only, two had a positive nose only, and the other had a positive nose and throat. A type report was available for seven out of the eight carriers, and all of these were gravis. Four carriers were in the senior division, one in the junior, and three in the infants (see Table III). Naturally, all of these

children were excluded from school. For various reasons general swabbing was not completed until April 6.

The school broke up for Easter on April 11 and four further cases were reported during the holidays. One case (No. 15) developed on April 9, 14 days after she had received 500 units of antitoxin and 0.3 ml. of A.P.T. Another case (No. 18) was taken ill on April 16, 21 days after similar treatment. The other two (Cases 16 and 17) were Schick-negative children who had not received any further injections, and they developed their illness on April 9 and 15 respectively. The number of clinical cases associated with the second phase of the outbreak now totalled 10 (see Table II).

During the week before May 2, the date on which the school was due to reopen, a further complete swabbing of all the children and staff was carried out at the school by special appointment; the results were negative. At the same time a further 0.5 ml. of A.P.T. was given to children who had been Schick-positive and a boosting dose of 0.5 ml. was given to Schick-negatives. No further case occurred after April 16.

TABLE I.—*Cases of Diphtheria: First Phase*

| Case | Age | Form | Date of Immunization | Prophylactic Used | No. of Injections | Schick Test | Date of Onset | Date Last in School | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15 | IV Sen. | 1940 | Not known | 2 | Not done | 22/2/46 | 22/2/46 | Mild tonsillitis and heavy nasal infection |
| 2 | 15 | IV Sen. | 1937 | T.A.F. | 3 | ,, ,, | 27/2/46 | 28/2/46 | Severe |
| 3 | 14 | III Sen. | 1942 | Not known | ? | ,, ,, | 2/3/46 | 28/2/46 | Mild, slept with Case 2 |
| 4 | 15 | IV Sen. | 1938 | T.A.F. | 3 | ,, ,, | 3/3/46 | 28/2/46 | Severe |
| 5 | 15 | III Sen. | 1941 | A.P.T. | 2 | ,, ,, | 3/3/46 | 28/2/46 | Mild |
| 6 | 14 | III Sen. | 1941 | ,, | 2 | ,, ,, | 3/3/46 | 28/2/46 | Severe |
| 7 | 8 | Prep. I Jun. | 1941 | ,, | 2 | ,, ,, | 1/3/46 | 28/2/46 | Moderate |
| 8 | 12 | I Sen. | 1941 | ,, | 2 | ,, ,, | 2/3/46 | 28/2/46 | Mild |

TABLE II.—*Cases of Diphtheria: Second Phase*

| Case | Age | Form | Date of Immunization | Prophylactic Used | No. of Injections | Schick Test | Date of Onset | Date Last in School | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| 9 | 15 | IV Sen. | Not done | — | — | Not done | 23/3/46 | 22/3/46 | Severe |
| 10 | 14 | III Sen. | ,, ,, | — | — | ,, ,, | 23/3/46 | 22/3/46 | ,, |
| 11 | 13 | II Sen. | 1940 | A.P.T. | 2 | Neg. 26/3/46 | 26/3/46 | 26/3/46 | Mild |
| 12 | 12 | I Sen. | 1941 | ,, | 2 | Slight pos. 26/3/46 | 26/3/46 | 26/3/46 | Moderate |
| 13 | 10 | Prep. I Jun. | 1941 | Not known | ? | Pos. 26/3/46 | 26/3/46 | 26/3/46 | Severe |
| 14 | 9 | Prep. II Jun. | 1944 | A.P.T. | 2 | Neg. 26/3/46 | 26/3/46 | 26/3/46 | Mild |
| 15 | 14 | III Sen. | 1935 | ,, | 1 | Pos. 26/3/46 | 9/4/46 | 10/4/46 | Moderate |
| 16 | 12 | I Sen. | 1942 | ,, | 2 | Neg. 26/3/46 | 9/4/46 | 9/4/46 | ,, |
| 17 | 12 | I Sen. | 1941, 1944 | ,, | 2, 1 | Neg. 26/3/46 | 15/4/46 | 10/4/46 | Mild |
| 18 | 14 | III Sen. | 1939 | Not known | ? | Pos. 26/3/46 | 16/4/46 | 10/4/46 | Very mild (not typical) |

TABLE III.—*Diphtheria Carriers*

| Case | Age | Form | Date of Immunization | Prophylactic Used | No. of Injections | Schick Test | Date Last in School | Remarks |
|---|---|---|---|---|---|---|---|---|
| A | 17 | V Sen. | 1934 | T.A.F. | 3 | Neg. 26/3/46 | 19/3/46 | Throat negative, nose positive |
| B | 14 | III Sen. | 1941 | ? | 2 | Neg. 26/3/46 | 28/3/46 | Throat positive, nose negative |
| C | 8 | Prep. I | 1942 | A.P.T. | 2 | Neg. 26/3/46 | 5/4/46 | ,, ,, |
| D | 6 | Infant B | 1942 | ,, | 2 | Neg. 11/3/46 | 5/4/46 | Throat negative, nose positive |
| E | 13 | II Sen. | 1943 | ? | ? | Neg. 26/3/46 | 5/4/46 | Throat positive, nose positive |
| F | 13 | IIB Sen. | 1943 | A.P.T. | 2 | Neg. 26/3/46 | 5/4/46 | Throat positive, nose negative |
| G | 8 | Inf. trans. | 1942 | ,, | 2 | Neg. 26/3/46 | 8/4/46 | ,, ,, |
| H | 6 | Infant A | 1943 | ,, | 2 | Neg. 26/3/46 | 8/4/46 | ,, ,, |

## Discussion

A notable feature of the first phase was the explosive nature of the outbreak. Reviewing the cases in retrospect, it will be seen that one patient (Case 1) became ill about a week before the others, her illness having started on Feb. 22, the date she was last at school. It may be that the closing of the school for the half-term holiday period was instrumental in preventing further spread during this phase.

The reason why the infection remained quiescent for some three weeks and then flared up again is not clear. Where typing was carried out (12 cases and 7 carriers) the organism was of the gravis type. It is therefore a fair assumption that this type of organism was responsible for the whole occurrence. Judging by the severity of the illness in some of the children who had been previously immunized, the degree of virulence must have been very high. The development of symptoms and membrane was in a number of cases extremely rapid. The virulence was such that a guinea-pig was killed in 24 hours. At some previous time all except two, or possibly three, of the 18 cases had received immunization which was probably adequate, and at least four were Schick-negative just before the onset of the illness. This probably accounts for the fact that there were no deaths. The state of immunization of the children was comparatively good, 94% having been immunized at some time previous to 1946. This was reflected in the Schick-negative rate, which amounted to 80%.

Analysis of the cases shows that three occurred among 23 children who had never been immunized (a case rate of 13%), while 15 occurred among 299 immunized children (a case rate of 5%). One case included in the first group received one injection more than 10 years before, and is not regarded as having been immunized. Dividing the immunized childen into two groups—those immunized within five years and those before that period—it was found that the percentage of cases was approximately equal. It appeared, however, that with regard to clinical severity those patients more recently immunized had some advantage over the others. Bearing in mind that the numbers involved are small, the following table is given for what it is worth:

| | Severe | Moderate | Mild |
|---|---|---|---|
| Cases immunized within five years | 2 (20%) | 3 (30%) | 5 (50%) |
| Cases immunized longer than five years | 2 (40%) | 1 (20%) | 2 (40%) |
| Cases not immunized | 2 (66.6%) | 1 (33.3%) | |

There was an anomaly in the infants' division. Taken by itself, although the immunization rate was 96% the Schick-negative rate was only 69%. It is rather striking that no cases occurred in this division, although there was evidence of a carrier condition in three cases. It is possible that there is a more rapid response of the protective mechanism to a secondary stimulus in the younger age groups.

The second phase of the outbreak was dealt with in general on the lines advocated by Fulton, Taylor, Wells, and Wilson (1941), with the exception that combined active and passive immunization was confined in the main to Schick-positive reactors. Four cases developed after this procedure; two were Schick-positives (Cases 15 and 18) who had received 500 units of antitoxin and 0.3 ml. of A.P.T. 14 and 21 days, respectively, before the onset of their illness, and the other two (Cases 16 and 17) were Schick-negative children. In view of the fact that four cases went down in the 24 hours intervening between Schick testing and reading it is clear that it is inadvisable to wait even 24 hours for Schick-test results before carrying out immunizing measures in the face of virulent infection. Furthermore, four of the cases were Schick-negative reactors. The repeat swabbing and boosting doses to Schick-negatives before readmission after the Easter holidays were carried out as additional safety measures. A difference of opinion exists as to the value of general swabbing, and it is true that most of the carriers gave only one positive result, although a few were more persistent.

In this district, where the average incidence of diphtheria is low and the diphtheria carrier is almost non-existent, it has been the policy to swab close contacts and to take measures to restrict their movements when positive. In an episode such as this it would be difficult to ignore the possible danger to others from unknown carriers of virulent organisms, and universal swabbing, with full recognition of its limitations, should be employed. It should, however, be completed in the shortest possible time so that all infected children, whether carriers or cases, may be excluded without delay.

It is clear from this experience that even a highly immunized community as judged by present-day standards is not entirely safe against a very virulent type of organism. It is also clear that immunization is of limited value unless it is maintained by boosting doses at regular intervals during the whole of school life. Opinions will differ as to how much of this work is necessary or practicable in order to reach the desired end. Parents do not take kindly to over-frequent injections for their children, and after infancy the frequency of sharp reactions with A.P.T. has a bad propaganda value for the whole scheme of immunization. Even T.A.F. is not without its quota of discomfort. The Schick test is not reliable enough to justify the omission of immunizing injections in negative cases, but serves a useful purpose in measuring the conversion rate of various batches of antigen. In the present state of our knowledge it is suggested that the normal immunizing course in infancy should be followed by a boosting dose of selected antigen every three years irrespective of Schick-test readings. The antigen selected and the dose given will be a matter of individual choice.

**Summary**

An outbreak of diphtheria is described which occurred in a day school where 94% of the children had a history of previous immunization and 80% were Schick-negative.

The necessity for repeated doses of antigen during the whole of school life is emphasized. The interval suggested between doses is three years.

The limited value of the Schick test as a measure of immunity is pointed out.

I should like to express my gratitude to Dr. Stone, of the E.M.S. Laboratory, Epsom, for her most valuable help in carrying out the bacteriological work, and to the medical officers of health of adjoining districts—Dr. Ellis, Dr. Ive, Dr. Johns, and Dr. MacIntyre—for their enthusiastic co-operation.

REFERENCE

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# FAUCIAL DIPHTHERIA AMONG ARMY PERSONNEL IN BELGIUM, 1945

## AN ANALYSIS OF 122 CASES

BY

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The purpose of this paper is to discuss certain aspects of the diagnosis and management of diphtheria in circumstances a little different from those usually obtaining in civil life. It was known before the invasion of Europe that diphtheria was prevalent in German-occupied Belgium and Holland, and it was recognized that when this part of the Continent was reached the disease might become a major medical problem. Consequently, compulsory lectures and demonstrations were arranged for medical officers of adjacent units. Prompt administration of serum was stressed and the admission to hospital of doubtful cases was encouraged. It followed that a very large number of patients who in normal circumstances would never have got beyond the stage of ambulant treatment were admitted to hospital for a brief period and had a thorough bacteriological investigation of their throats.

### The Investigation

*Bacteriology.*—The absence of facilities for testing the virulence of organisms limited the scope of the investigation, and the bacteriological diagnosis has depended upon assessments from the point of view of morphology, cultural characteristics, and biochemical reactions of the organisms. The following bacteriological technique was employed: Preliminary throat swabs were plated on: (1) tellurite plates (Hoyle's modification)—it is better to avoid human blood in this preparation as it is less inhibitory to organisms other than those of diphtheria; (2) blood-agar plates, 5% blood; (3) Loeffler slopes. A smear was stained with methylene blue and examined for Vincent's organisms. No attempt was made to diagnose diphtheria on the direct smears. The next day a combined smear was made from the Loeffler slope and the blood-agar plate and stained with Albert's stain. The blood-agar was also examined for haemolytic streptococci and the Hoyle plates were inspected for growth. If the slide was positive a diagnosis of morphological diphtheria was made and the result was immediately sent to the ward. The Loeffler slope which showed a morphological diphtheria bacillus was retained. If there was no growth on tellurite in 48 hours the Loeffler slope was subcultured to another tellurite plate. The following day the Hoyle plates were examined. Colonies were studied macroscopically and microscopically. All those showing a rod form were subcultured to a medium which was found to have an advantage over a Loeffler slope.

The medium consisted of 10% serum (animal sera were better than human); 100 ml. of agar; 0.50 ml. of neutral red as supplied for MacConkey's medium; and 1% saccharose. The last three were heated together until the agar was melted, and on cooling to 45.5° C. the serum was added and it was then poured into Petri dishes. This medium was found to be of more value than subculturing back to Loeffler slopes, for the following reasons: (1) Colonies on this medium could be viewed and easily manipulated. (2) Frequently when using Loeffler slopes cocci were found as a contaminant on subculturing

from Hoyle plates. (3) Single colonies could be picked off with ease and put into saccharose Hiss serum water. (4) With experience the saccharose and non-saccharose fermenters could be differentiated immediately. (5) The morphology, altered by growth on tellurite, was immediately restored on the serum-saccharose medium. The growth on the above medium was then subcultured to glucose and starch serum-water media. Haemolysis was studied by subculturing on to 5% blood-agar plates.

The diagnosis as to type was based on: colonial appearances on tellurite plates; morphological appearance of organisms from a serum–sucrose medium; sugar reactions; presence or otherwise of haemolysis on blood agar; presence or absence of granularity in fluid media. Clearance swabs were plated direct on to tellurite and examined in 48 hours. If growth had occurred sugar reactions were determined.

*Ward Procedure.*—Throat swabs were taken on admission and a preliminary laboratory diagnosis was obtainable by the following morning. This was confirmed later by subcultures and sugar reactions. Serum was given on clinical evidence, and where clinical and laboratory findings were at variance swabbing was repeated—often two or three times. Penicillin was being administered in the form of pastilles over a period of five days. It was not given until the diagnosis was certain, and it was considered desirable to wait five days after its last administration before starting the bacteriological investigation of the throat. As a result, clearance swabbing was not begun until the fifteenth to eighteenth day. Patients were swabbed—both nose and throat—on three consecutive days each week, until three negative swabs were obtained. Half of the cases clearing early had an additional swab or swabs beyond those necessary for clearance.

*Material.*—The period covered was from Jan. 1 to May 30, 1945, and records of 122 cases were available, 17 of which were not direct admissions. The latter are included, as they were observed for development of circulatory and neurological complications. In only one of these was the type of organism recorded, and they were excluded from investigations concerning duration of symptoms before admission, appearance of throat on admission, serum dosage, and, with the one exception, type of organism. Owing to the unexpected disbandment of the hospital a number of records were lost. Complete records of throat examinations were available only up to the end of April (Table I), but personal records of the actual cases of diphtheria were saved. The records of five cases were also lost, and these are incomplete as regards duration of symptoms, throat appearance, serum, and complications, but are available for type and, in all but one, throat clearance.

TABLE I.—*Throat swabs, January to April, 1945*

| | |
|---|---|
| Diphtheria | 108 |
| Vincent's angina | 39 |
| Haemolytic streptococci | 985 |
| Nil | 33 |
| Total | 1,165 |

TABLE II

| | Duration in Days | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Less than 1 | 1–2 | 2–3 | 3–4 | 4–5 | 5–6 | 6–7 | Total |
| No. of cases | 38 | 29 | 11 | 8 | 1 | 2 | 1 | 90 |

The result has been some differences in the total number of cases in the various analyses, but the manner of their omission excludes the possible introduction of bias.

*Types of Diphtheria.*—Analysis of the first four months (Jan. to April, 1945) showed the following types: mitis 49, intermedius 9, gravis 34, morphological 16; total 108.

The figures shown (Table II) regarding the *duration of symptoms* before admission speak well for the effectiveness of the lecture demonstrations.

### Clinical Diagnosis

It became obvious that membrane formation as a basis for clinical diagnosis was relatively useless. Many cases were seen too early for the formation of true membrane, and five presented with no exudate at all, but developed it the following day. All of these five were seen on their first day. True membrane was found in only 27 cases, the remainder having exudate—follicular to confluent in type—readily wiped off by the swab (Table III).

TABLE III

| | Exudate | | | True Membrane | Total |
|---|---|---|---|---|---|
| | None | Follicular | Confluent | | |
| No. of cases | 5 | 19 | 39 | 27 | 90 |
| Average duration of symptoms on admission (days) | 1 | 1·9 | 2·0 | 2·5 | |

Marked oedema of uvula, palate, and tonsillar regions was observed in 41 cases, and faucial oedema came to be considered of importance diagnostically—it being relatively rarely observed in the ordinary streptococcal throat. A very characteristic presenting type was the "two-day quinsy"; the appearance was due to marked oedema in the region of the tonsil—membrane or exudate being hidden behind the swollen mass. This was regarded as practically diagnostic of toxic diphtheria.

To summarize, the diagnostic criteria were as follows: Cases with membrane and the "two-day quinsy" cases were considered as definite diphtheria. Those showing confluent exudate were treated as diphtheria until proved otherwise by repeatedly negative swabs. Follicular exudate was viewed with suspicion, and the presence of oedema of the fauces was taken as strongly suggestive even in the absence of exudate.

*Hypertoxic Cases.*—Seven cases showed marked toxaemia on admission. Four were of the "bullneck" variety, with oedema of the neck extending down over the clavicles, and one of these developed oedema of the glottis, requiring tracheotomy. All those observed long enough for its development—five—showed late neurological complications. None gave any evidence of serious cardiac involvement. The duration of symptoms before admission was 2–3 days in one case, 1–2 days in 4 cases, and less than 1 day in 2 cases.

*Circulatory Complications.*—No serious cardiac complications were seen, and what changes were observed were very difficult to assess. Two cases developed extrasystoles for a short period in their third week. Four cases showed a pulse rate persistently below 50 per minute, but as they were all highly trained Commandos it was thought that this was a convalescence bradycardia. Four cases had pulse rates over 100 per minute while at rest, but at least two of them were very nervous individuals and one had been in hospital previously with a "nervous heart." Six cases showed tachycardia on leaving their beds for the first time. Seven cases had systolic blood pressures below 100—two on admission, the remainder at the end of the third week.

### Neurological Complications

Out of a total of 101 cases observed long enough to develop neurological complications, 31 were reported as having done so. Five of these were doubtful, leaving 26 definite cases. The majority of these progressed no further than paralysis of the palate, which in many instances was very transient—lasting no longer than a week. Seven cases

had later involvement of the pharynx and limbs. Only two cases were recorded with accommodation paralysis, but, as it was never specifically inquired for, minor degrees were probably missed.

The average time of onset of paresis was: palate 26, accommodation 34, pharynx 42, limbs 48 days. No respiratory or trunk paresis was observed, but cases with widespread involvement of limbs were evacuated and may have developed it subsequently. Of 32 cases showing faucial oedema 46.9% developed neurological complications as compared with 19.6% in 46 without oedema, out of a total of 78 cases whose records were complete in both respects. This difference gives a $\chi^2$ of 5.39 and $0.05>P>0.02$, and indicates the value of faucial oedema as a diagnostic sign.

Toxaemia seems to be the main factor influencing the development of neurological complications (Tables IV–VI) in that in this series they appear to be relatively unaffected by duration of symptoms prior to admission, by early clearance of the throat, and by the administration of serum.

TABLE IV

| Clinical Signs of Severity | No. of Cases | Proportion Complicated |
|---|---|---|
| Nil | 46 | 19·6% |
| Faucial oedema | 27 | 37·1% |
| Bullneck | 5 | 100% |

TABLE V

| Day of Disease when Admitted | No. of Cases | Proportion Complicated |
|---|---|---|
| 1st | 29 | 27·6% |
| 2nd | 27 | 33·3% |
| 3rd | 10 | 30·0% |
| 4th and over | 9 | 33·3% |

TABLE VI

| Throat Clear by 3rd Week | No. of Cases | Proportion Complicated |
|---|---|---|
| Yes | 41 | 35·5% |
| No | 26 | 26·9% |

Serum at first sight appears, if anything, to promote the development of neurological complications, but the fact that the more toxic cases received more serum probably accounts for the discrepancy (Table VII).

TABLE VII

| Serum in Units | No. of Cases | Proportion Showing Signs of Toxaemia | Proportion Complicated |
|---|---|---|---|
| 0–48,000 | 24 | 33% | 25% |
| 49–80,000 | 36 | 39% | 25% |
| 81,000+ | 18 | 56% | 50% |

As would be expected, gravis infections showed a higher percentage of cases with neurological involvement. A comparison of gravis with all other types gave $\chi^2=7.42$ and $P<0.01$ (Table VIII).

TABLE VIII

| Type | No. of Cases | Proportion Complicated |
|---|---|---|
| Gravis | 27 | 48% |
| Intermedius | 8 | 13% |
| Mitis | 40 | 20% |
| Morphological | 10 | 10% |

## Treatment and Management

*Serum.*—Serum was administered as soon as the clinical diagnosis was made, and was repeated next day if no improvement had occurred. An attempt was made to give the full dosage as a single injection, the degree of toxaemia being assessed on the first examination (Table IX). The intravenous route was used only with a serum dosage of 100,000 units or over. Hypertoxic cases received 100,000 units intravenously and 60,000 to 100,000 units intramuscularly. In addition they received penicillin intramuscularly—20,000 units 3-hourly up to a total dosage of at least 1,000,000 units. They also received penicillin

TABLE IX.—*Distribution of Serum Dosage*

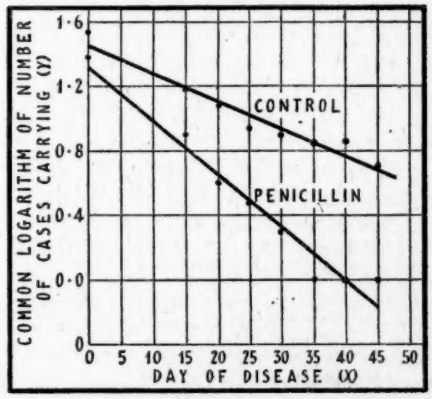
| Dosage | No. of Cases |
|---|---|
| 0– 24,000 | 4 |
| 25,000– 48,000 | 26 |
| 49,000– 72,000 | 31 |
| 73,000– 96,000 | 27 |
| 97,000–120,000 | 4 |
| 121,000–144,000 | 1 |
| 145,000–168,000 | 3 |
| 169,000–192,000 | 3 |
| 193,000–216,000 | 0 |
| 217,000–240,000 | 1 |
| Total | 100 |

pastilles by mouth. All patients were nursed flat for the first 21 days, or longer if complications intervened. Strict recumbency was not insisted on; they were allowed one pillow and were permitted to make themselves comfortable in bed.

*Penicillin Pastilles.*—Penicillin pastilles were prepared by the method of Martin (1944) with 500 units per pastille. They were available relatively late. The decision as to which case was to receive penicillin was decided by the toss of a coin—thus ensuring random selection. The only exceptions to this procedure were four of the hypertoxic cases. A total dosage of 200 pastilles over a period of five days was aimed at. The pastilles were held in the side of the mouth without sucking and continuously renewed. Twenty-four of the penicillin cases and 34 of the control series had been observed up to the 45th day, and the number still with positive throats at 5-day intervals was ascertained. Examination of Table X shows that the numbers fell off in geometric proportion, as would be expected from general considerations and from the work of Hartley and Martin (1919–20). Hence, taking the logarithm of these figures, we got two series, the relation of which to time could be quite adequately represented by straight lines

TABLE X

| Day: | 1 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| Penicillin | 24 | 8 | 4 | 3 | 2 | 1 | 1 | 1 |
| Control | 34 | 15 | 12 | 9 | 8 | 7 | 7 | 5 |




(see Graph). Regression lines were calculated by the method of least squares, and gave the following formulae:

Letting $y$=number carrying on any particular day
Letting $x$=the particular day
Penicillin $\log_{10}$ $y=1.3529-0.03391\,x$
Control $\log_{10}$ $y=1.4696-0.01765\,x$

The first figure to the right of the equation is a function purely of the number of cases in each group. The second figure is an estimate, in the form of a regression coefficient, of the logarithm of the rate of clearance of each particular group—a figure which varies from epidemic to epidemic. The difference between these two regression coefficients—0.01627—is an index of the difference in rate of clearance between the two groups. This figure can be shown to be highly significant statistically, its standard error being 0.003338, giving a "t" of 4.88 and a probability for 12 degrees of freedom which is less than 0.001. The figures compare favourably with the formula obtained by Hartley and Martin:

$$\text{Log}_{10}\, y = 2.6002 - 0.0218\, x$$

The statistical methods were derived from Fisher (1944), and Yates's correction for continuity was used throughout in the estimation of $\chi^2$.

### Discussion

This epidemic has been described because it is felt that it is comparatively unusual in four points—namely, the short duration before admission, the large serum doses used, the age group covered, and the use of penicillin pastilles.

The short duration of symptoms before admission demonstrates the value of brief educational talks during epidemic periods. From the figures, prompt administration of an adequate dosage of serum does not appear to play any great part in preventing the development of palatal paresis, although it may limit the neurological involvement. On the other hand, it is felt that the low incidence and comparative triviality of the circulatory changes may be the result of the treatment. With regard to factors operating in the development of neurological complications this series is not ideal for studying the effects of duration of symptoms prior to admission, as the majority were seen on the first or second day. The fact that we are dealing with an adult population, presumably partially immune, is reflected in the difficulty of diagnosis of early cases. The comparatively late development of membrane in the partially immune has been pointed out by Neubauer (1943), who also noticed that exudate was readily wiped off without bleeding. That a number of cases later progressed to membrane formation indicates that the appearance of follicular and confluent exudate is a stage in the development of membrane. Pallor of mucous membrane was of little diagnostic use in this epidemic, as 40% had a concomitant streptococcal infection.

The series receiving penicillin was small, but the results are statistically quite definite, and it can be assumed that penicillin pastilles are effective in increasing the rate of clearance. A number of late carriers were also treated with penicillin pastilles. The impression was formed that it was much less effective in this type of case, but the numbers treated were too small to be certain of this.

### Summary

An epidemic of diphtheria in adults has been described, notable for the short duration of symptoms before admission. Difficulties of diagnosis have been discussed and the results of a short series of cases treated with penicillin have been given.

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## PENICILLIN IN THE TREATMENT OF DIPHTHERIA

BY

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Diphtheria is one of the commonest causes of death among young children, and before the days of antitoxic serum it had a staggering mortality. Antitoxin has no doubt greatly reduced its mortality rate; nevertheless, it remains the most dangerous infectious disease to children. The sensitivity of *Corynebacterium diphtheriae* to penicillin is well known, but the therapeutic value of penicillin in diphtheria has not yet been ascertained.

### Review of Literature

Christie and Preston (1946) reported two cases of malignant diphtheria with bull-neck treated with heavy doses of antitoxic serum and penicillin: one patient died and the other recovered. Richard J. Dodds (1946) reported 13 cases of diphtheria treated successfully with systemic penicillin in addition to normal doses of antitoxin. Ercoli, Lewis, and Moench (1945) reported experiments in which penicillin in a concentration of just over 1 unit per ml. inhibited *C. diphtheriae in vitro*. They induced experimental bacteriaemia in mice by intraperitoneal injection of *C. diphtheriae* mixed with mucin. Subsequent injections of penicillin or sulphadiazine overcame the bacteriaemia. However, when toxin was injected subcutaneously into rabbits or guinea-pigs it could not be counteracted by penicillin. A small inoculum of bacilli injected into guinea-pigs produced a local lesion with toxaemia just like human infection. In such cases they found that penicillin had negligible action. These observers concluded that penicillin might be of slight benefit in the prophylaxis of exposed contacts but that it could have no appreciable value in the treatment of patients suffering from clinical diphtheria, for which antitoxin should be given without any delay.

Penicillin in the treatment of diphtheria carriers appears to have been tried successfully by Berman and Spitz (1945). They treated 10 diphtheria carriers with penicillin solution containing 500 units per ml. four times daily: 1 ml. of this solution was instilled into each nostril and 1 ml. was sprayed into the throat with an atomizer. Within five days all reverted to a non-carrier state, whereas with a control group this took five to seven weeks. These observers believe that penicillin offers a quick and simple solution to the problem of diphtheria carriers. The fact that the organisms disappear quickly from the nasopharynx indicates that penicillin may be used as an adjunct in the treatment of clinical diphtheria. The replacement of antitoxin by penicillin, however, is not advocated.

It will be seen that there is no report of the use of penicillin without antitoxic serum in the treatment of clinical diphtheria. A trial of this nature is no doubt fraught with risk, as penicillin, although effective against *C. diphtheriae*, has no action on its toxin. The present study was undertaken with a view to ascertaining whether the drug can be used alone in place of the serum. The risk has been minimized by selecting early cases, under the assumption that

the child can destroy and/or eliminate a certain amount of diphtheria toxin. A few moderately severe cases have also been treated, but we kept a very close watch on them for development of bad symptoms.

The following facts should be kept in mind when conducting a clinical trial of penicillin in diphtheria: (1) That the main cause of death in diphtheria is the injurious action of the powerful exotoxin secreted by *C. diphtheriae* on the circulatory and nervous systems, and that the therapeutic value of antitoxic serum is due to its ability to neutralize this exotoxin, on which penicillin has no direct effect. (2) That there are cases of diphtheria in which death is due to asphyxia caused by mechanical obstruction of the air passage by the diphtheritic pseudomembrane. Penicillin by exerting its lethal effect on *C. diphtheriae* may be able to check further formation and spread of such membranes when it is used early enough. (3) That the role of secondary respiratory infections in increasing the mortality in diphtheria is not insignificant, and penicillin may be a valuable therapeutic agent against such infections.

## Method

For the sake of convenience the series was divided into four groups. Only penicillin was given in each case, the mode of administration in all cases being as follows:

A solution of a sodium salt of penicillin containing 100,000 units in 20 ml. of sterile normal saline was used. Of this solution 2 ml. (containing 10,000 units) was injected intramuscularly every three hours, using a 2-ml. syringe that had been sterilized by boiling, the penicillin solution being kept in a refrigerator. The time for stopping the penicillin injections was determined by the following factors: (1) the fall of temperature and pulse rate to normal level, (2) the disappearance of the pseudomembrane, and (3) three consecutive negative swab cultures taken daily. The minimum period of treatment with penicillin was four days and the maximum period seventeen days. It will be evident from the case reports that the injections of penicillin were continued longer than necessary. In many of the earlier cases penicillin was given even when the patch had disappeared and the throat swab had become bacteriologically negative. This was due to our ignorance about the dose necessarily effective in diphtheria. We were trying to cover a new field of clinical investigation, which we were afraid might be injurious to the patients. Hence, when treatment with penicillin was first started in August, 1945, the drug was given for a period probably longer than necessary; this was just to be on the safe side. Later it was found that there was no need to continue penicillin when the patch cleared up and the swab became negative.

## Classification into Groups

*Group I: Early Cases, Bacteriologically Positive.*—There were 12 cases (8 females and 4 males); 11 were Hindus and 1 a Muslim; their ages varied from 8 months to 11 years. They had had fever and sore throat for two to six days. The temperature ranged from 99° to 104° F. (37.2°–40° C.), and the general condition was good. They had either a small patch on one or both tonsils or a moderate-sized patch on one tonsil. Before starting penicillin injections throat and nasal swabs were taken and inoculated immediately on the spot into Dorset's egg medium or Loeffler's serum medium. Within 48 hours the temperature dropped to normal in seven cases and within three to six days in the rest. The patches cleared up completely within two to five days. The throat swabs became negative in three to seven days after treatment was started, the total dose of penicillin required varying from 390,000 to 510,000 units. The patients were kept in hospital for one to four weeks but had no complications, so were discharged as cured, and parents were asked to report every week if any complication occurred. One of the patients had an attack of non-diphtheritic sore throat about a week after discharge. This was successfully treated with sulphonamides, and tonsillectomy was advised. No bad report was received from the remaining cases.

*Group II: Early Cases, Bacteriologically Negative but Clinically Diagnosed as Classical Diphtheria.*—There were eight such cases—all Hindu boys aged from 10 months to 6½ years. They came with a history of slight fever and cough of one to four days' duration. They had a small patch on one or both tonsils, a moderate-sized patch on one tonsil, or a small patch on one tonsil and another small patch on the uvula. The patches had all the characteristics of diphtheritic membrane, and so they were diagnosed as classical diphtheria. Their rectal temperature varied from 99° to 102° F. (37.2° to 38.9° C.) and their general condition was good. Before starting treatment throat and nasal swabs were inoculated into culture media. Within 72 hours the temperature dropped to normal except in one case where the temperature fell to normal on the sixth day. Within two to three days the patches cleared up completely. The throat and nasal swabs were negative from the beginning. Two patients who had received 480,000 and 560,000 units of penicillin were discharged at the request of their parents after a week's stay in hospital, and the parents were instructed to report if complications occurred at home. Another patient had had 480,000 units of penicillin when his parents took him away on risk bond. At the time of discharge he was doing well and there was no trace of a patch in the throat. The remaining cases had 320,000 and 400,000 units of penicillin and were discharged after two to four weeks.

*Group III: Moderately Severe Cases, Bacteriologically Positive.*—There were four of these cases—two Hindu boys aged 3 and 4 years and two Muslim girls aged 3. They had had a fever and sore throat for six or seven days; one had slight suction. Three had large patches on both tonsils and a small one on the uvula; one had small patches on both tonsils, with bleeding from the nose and enlarged cervical and maxillary lymph nodes. Two were slightly toxic. After taking nasal and throat swabs penicillin was started. Within three to six days the temperature fell to normal, with improvement of the pulse rate and disappearance of the patch. Throat swabs were negative in three days in two cases, in five days in one, and in six days in the other. They received 400,000, 480,000, 720,000, and 1,190,000 units of penicillin. They were kept under observation for four weeks without there being any complication and were then discharged as cured. No report of any complication has been received.

*Group IV: Moderately Severe Cases, Bacteriologically Negative but Clinically Diagnosed as Classical Diphtheria.*—In this group there were three cases—two boys and one girl; all were Hindus, their ages being 1, 2½, and 3 years. They came with a history of fever and sore throat of three to seven days' duration. They were slightly toxic, the temperature varying from 99° to 101° F. (37.2° to 38.3° C.). One had a moderate-sized patch on each tonsil; the second had a moderate-sized patch on the tonsils and uvula, hoarseness of voice, and slight difficulty in breathing; and the third had one moderate-sized patch on the left tonsil and another in the pharynx. The patches had all the typical characteristics of diphtheritic membranes. Throat and nasal swabs were inoculated before any treatment was started. Within one to three days the temperature came down to normal. The patches cleared up in two to three days. Suction and hoarseness of voice disappeared next day. The patients received 360,000, 365,000, and 400,000 units of penicillin. Two of them were kept in the hospital for four and five weeks without any complication and were then discharged as cured. The third stayed for

two weeks, and was reported to be keeping well a fortnight after discharge from hospital.

## Case Reports

*Case 1.*—A female Hindu child aged 4 was admitted on Sept. 5, 1945, with a history of fever and sore throat for six days. General condition fair. Temperature 99° F. (37.2° C.), pulse 120, respirations 24. Small patch on left tonsil and another on tip of uvula. Throat swab positive. Temperature fell to normal within 48 hours; patch cleared up within five days; swab became negative in seven days. Total dose of penicillin, 960,000 units. No complications. Discharged on Sept. 17 at request of parents. No bad report received.

*Case 2.*—A female Hindu child aged 1 was admitted on Sept. 10, 1945, with a history of fever and sore throat for four days. General condition fair. Temperature 99° F., pulse 125, respirations 24. Tonsils congested and enlarged; patch on both tonsils. Throat swab positive. Temperature dropped to normal within 48 hours; patch cleared up in three days; swab became negative in five days. Total dose of penicillin, 560,000 units. No complications. Discharged on risk bond on Sept. 17. No bad report received since.

*Case 3.*—A male Hindu child aged 2½ was admitted on Sept. 10, 1945, with a history of fever and sore throat for five days. General condition fair. Temperature 99° F., pulse 110, respirations 24. Tonsils enlarged; patch on left tonsil. Throat swab positive. Temperature fell to normal in 24 hours; patch cleared up in two days; swab became negative in three days. Penicillin was stopped on Sept. 19. Total dose, 720,000 units. No complications. Discharged on Sept. 21. Had an attack of non-diphtheritic sore throat; treated successfully with a sulphonamide and was advised to have tonsillectomy afterwards.

*Case 4.*—A female Hindu child aged 10 was admitted on Nov. 14, 1945, with history of fever and sore throat for two days. General condition fair. Temperature 102° F. (38.9° C.); pulse 135, respirations 32. Tonsils enlarged; patch on both tonsils. Throat swab positive. Temperature fell to normal within 36 hours; patch cleared up in two days; swab became negative in three days. Penicillin stopped on Nov. 22. Total dose, 640.000 units. No complications. Discharged on Nov. 23. No bad report received since.

*Case 5.*—A female Muslim child aged 3 was admitted on March 27, 1946, with a history of fever and sore throat for six days and otorrhoea for two days. General condition fair. Temperature 102° F., pulse 126, respirations 30. Tonsils much enlarged; patch on both tonsils. Nose blocked with dry blood clot at the nares. Small furuncles in left external ear, which was discharging pus. Cervical lymph nodes enlarged. Throat swab positive; ear and nasal swabs negative. Temperature dropped to normal within three days; patch cleared up in four days; swab became negative in five days. Bleeding from nose stopped in two days. Penicillin was stopped on April 2. Total dose, 480,000 units. No complications. Discharged on April 24. Everything normal except slight discharge from left ear.

*Case 6.*—A male Hindu child aged 10 months was admitted on Sept. 10, 1945, with a history of fever and sore throat for two days. General condition fair. Temperature 100° F. (37.8° C.), pulse 130, respirations 30. Tonsils enlarged; one small patch on left tonsil and another on uvula. Throat swab negative. Temperature dropped to normal in 72 hours; patch cleared up in two days. On Sept. 15, the day of discharge, his throat was clear. Total dose of penicillin, 480.000 units.

*Case 7.*—A male Hindu child aged 6 was admitted on Sept. 12, 1945, with a history of fever and sore throat for two days. General condition fair. Temperature 100° F., pulse 112, respirations 24. Tonsils enlarged, small patch on left tonsil. Throat swab negative. Temperature fell to normal within 72 hours; patch cleared up in three days. Penicillin stopped on Sept. 19. Total dose, 560.000 units. No complications. Discharged on Sept. 21 at request of parents. No bad report received since discharge.

*Case 8.*—A male Hindu child aged 1½ was admitted on Nov. 21, 1945, with a history of fever and sore throat for one day. General condition fair. Temperature 100° F., pulse 134, respirations 32. Tonsils enlarged; small patch on both tonsils. Throat swab negative. Temperature fell to normal within three days; patch cleared up in two days. Penicillin stopped on Nov. 27. Total dose, 480,000 units. No complications. Discharged on Nov. 28 at request of parents. No bad report received since discharge.

*Case 9.*—A male Hindu child aged 6½ was admitted on April 22, 1946, with a history of fever and sore throat for one day. General condition fair. Temperature 102° F., pulse 120, respirations 26. Small patch on both tonsils. A few rhonchi in lungs. Throat swab negative. Temperature dropped to normal in three days; patch cleared up in three days. Penicillin stopped on April 27. Total dose, 400,000 units. No complications. Discharged on May 4. No bad reports received since.

*Case 10.*—A male Hindu child aged 1 year was admitted on April 24, 1946, with a history of fever and sore throat for four days. General condition fair. Temperature 100° F., pulse 135, respirations 30. Patch on left tonsil. Throat swab negative. Temperature dropped to normal within three days; patch cleared up in three days. Penicillin stopped on April 28. Total dose, 320,000 units. No complications. Discharged on May 5. No bad report received since.

*Case 11.*—A male Hindu child aged 3 was admitted on Aug. 6, 1945, with a history of fever and sore throat for seven days. Slightly toxic. Temperature 103° F. (39.4° C.), pulse 140, respirations 28. Moderate-sized patch on tonsils and uvula. Throat swab positive. Submaxillary lymph glands enlarged and tender. Temperature fell to normal within 72 hours; patch cleared up in three days; swab became negative after five days; the glands subsided in five days. Penicillin stopped on Aug. 15. Total dose, 720,000 units. No complications. Discharged on Aug. 30. Reported to be keeping well a fortnight later.

*Case 12.*—A female Muslim child aged 2 was admitted on Aug. 22, 1945, with a history of fever and sore throat for seven days. Slightly toxic. Temperature 102° F. (38.9° C.), pulse 150, respirations 32. Slight suction. Moderate-sized patch on tonsils and uvula. Throat swab positive. Temperature dropped to normal within three days; patch cleared up in four days; swab became negative after six days. On Aug. 25 penicillin had to be stopped owing to lack of supply. The temperature again shot up. Penicillin restarted on Aug. 27 and temperature fell to normal on Sept. 5. After this she had an uneventful recovery. Penicillin stopped on Sept. 11. Total dose, 1,190,000 units. Discharged on Sept. 25. No bad report received since.

*Case 13.*—A male Hindu child aged 3 was admitted on Aug. 10, 1945, with a history of fever and sore throat for seven days. Slightly toxic. Temperature 99° F. (37.2° C.), pulse 125, respirations 28. Moderate-sized patch on both tonsils. Throat swab negative. Temperature dropped to normal within 24 hours; patch cleared up in two days. Penicillin stopped on Aug. 14. Total dose, 365,000 units. No complications. Discharged on Sept. 17. No bad report received.

*Case 14.*—A female Hindu child aged 2½ was admitted on April 7, 1946, with a history of fever and sore throat for three days. Temperature 100° F. (37.8° C.), pulse 140, respirations 35. Slightly toxic. Voice hoarse. Slight suction present; cervical lymph glands enlarged. Moderate-sized patch on tonsils and uvula. Throat swab negative. Temperature dropped to normal within 48 hours; patches cleared up within three days. The suction and hoarseness of voice disappeared on the fourth day and the glands subsided within five days. On April 24 she developed slight pyrexia (99°–100° F. (37.2°–37.8° C.)), which continued intermittently till April 30. No local signs could be detected to account for fever. She was discharged on risk bond on May 2. Penicillin was stopped on April 12. Total dose, 400,000 units. No bad report received since discharge from hospital.

*Case 15.*—A male Hindu child aged 1 year was admitted on April 15, 1946, with a history of fever and sore throat for four days. Temperature 100° F., pulse 130, respirations 38. Slightly toxic. Moderate-sized patch on left tonsil and another on pharynx. Throat swab negative. Temperature fell to normal within three days; the patch cleared up in three days. On April 22 he developed slight pyrexia, which continued

intermittently for about a week. No local sign could be found to account for fever. Temperature normal on May 2. He was discharged on risk bond on May 3. Penicillin was stopped on April 19. Total dose, 360,000 units. Reported to be keeping fit a fortnight after discharge.

*Case 16.*—A Hindu female child aged 7 was admitted on Sept. 25, 1946, with history of fever for two days, pain in throat, and difficulty in deglutition. Anaemia present. Neck glands enlarged both sides. Tonsils enlarged, with moderate-sized patches. Throat swab positive. Temperature 99.6° F. (37.55° C.), pulse 124, respirations 32. Temperature dropped to normal within 48 hours. Patch cleared up within five days. Total dose of penicillin, 485,000 units. Discharged on Oct. 31. No complications.

*Case 17.*—A Hindu male child aged 11 was admitted on Sept. 4, 1946, with history of painful throat and difficulty in deglutition for two to three days. No history of fever. General condition fair. Temperature 98.4° F. (36.9° C.), pulse 88, respirations 24. Moderate-sized patch on both tonsils. Throat swab positive. Patches disappeared on fourth day. Throat swab negative after two days. Total dose of penicillin, 390,000 units. No complications. Discharged on Sept. 26.

*Case 18.*—A Hindu female child aged 10 was admitted on Aug. 2, 1946, with a history of fever for four days, difficulty in deglutition for two days, and painful throat. General condition fair. Moderate-sized patch on right tonsil and small one on left tonsil. Temperature 99° F. (37.2° C.), pulse 110, respirations 26. Cervical lymph nodes enlarged and tender. Throat swab positive. Temperature fell to normal on third day. Patch disappeared on fourth day. Throat swab negative on third day. Total dose of penicillin, 430,000 units. No complications. Discharged on Aug. 27.

*Case 19.*—A Hindu male child aged 6 was admitted on July 31, 1946, with history of fever and sore throat for seven days. General condition fair. Moderate-sized patch on both tonsils. Temperature 104° F. (40° C.), pulse 134, respirations 32. Throat swab positive. Temperature reached normal level on fifth day. No patch detected on fourth day. Throat swab negative on third day. Total dose of penicillin, 510,000 units. No complications. Discharged on Aug. 27.

*Case 20.*—A Hindu female child aged 7 was admitted on Sept. 2, 1946, with a history of fever and sore throat for one day. Moderate-sized patch on left tonsil and small one on the right. General condition good. Throat swab positive. Temperature 103° F. (39.4° C.), pulse 140, respirations 32. Temperature fell to normal on seventh day. Patch disappeared on fifth day. Throat swab negative on second day. Total dose of penicillin, 460,000 units. No complications. Discharged on Sept. 26.

*Case 21.*—A Hindu male child aged 8 months was admitted on July 17, 1946, with a history of fever and cough for eight days and reluctance to feed for the last three days. General condition fair. Small patch on left tonsil. Temperature 100° F., pulse 122, respirations 24. There was also extensive impetigo. Throat swab positive. Temperature came down to normal on fifth day. Patch disappeared on fourth day and throat swab negative on third day. Total dose of penicillin, 470,000 units. No complications. Discharged on Aug. 23.

*Case 22.*—A Muslim female child aged 3 was admitted on March 7, 1946, with a history of fever for six days, difficulty in breathing for four days, and difficulty in deglutition and painful throat for four days. Tonsils very much enlarged and covered with several small thin patches. Cervical and submaxillary lymph glands of both sides were enlarged. Temperature 103.8° F. (39.9° C.), pulse 122, respirations 32. Throat swab positive. Temperature reached normal level on third day. Patch disappeared on fifth day and throat swab became negative on third day. Total dose of penicillin, 480,000 units. No complications. Discharged on April 24.

*Case 23.*—A Hindu male child aged 4 was admitted on Nov. 1, 1946, with history of fever and cough for two days and slight difficulty in breathing. General condition fair. Tonsils enlarged. Moderate-sized patch on right tonsil, extending down towards the larynx, a small crescentic patch on left tonsil, and a small patch on the uvula. Temperature 100° F., pulse 110, respirations 36. Throat swab positive. Temperature reached normal level on sixth day; patch disappeared on fifth day. Throat swab negative on third day. Total dose of penicillin, 400,000 units. Discharged on Dec. 4.

*Case 24.*—A Hindu child aged 8 months was admitted on Aug. 2, 1946, with a history of fever for one day, with excessive salivation. General condition fair. Small patch on right tonsil. Temperature 100° F., pulse 130, respirations 30. Throat swab positive. Temperature fell to normal on fourth day. No patch on throat on third day. Throat swab negative after second day. Total dose of penicillin, 390,000 units. No complications. Discharged on Aug. 22.

*Case 25.*—A Hindu male child aged 6½ was admitted on April 22, 1946, with a history of fever and painful throat for one day. General condition good. Small patch on both tonsils. Temperature 102° F. (38.9° C.), pulse 140, respirations 20. Throat swab negative. Temperature fell to normal on third day. Patch disappeared on third day. Total dose of penicillin, 400,000 units. No complications. Discharged on May 4.

*Case 26.*—A Hindu male child aged 1 year was admitted on April 24, 1946, with history of cough and fever for four days. General condition fair. Small patch on both tonsils. Glands of neck enlarged. Temperature 101.4° F. (38.55° C.), pulse 120, respirations 30. Throat swab negative. Temperature fell to normal on sixth day. Patch disappeared on third day. Total dose of penicillin, 400,000 units. No complications. Discharged on May 2 on request.

*Case 27.*—A male Hindu child aged 2½ was admitted on June 27, 1946, with a history of fever, cough, and excessive salivation for two days. A 1/4-in. (6-mm.) circular patch was seen on right tonsil. General condition fair. Temperature 102° F., pulse 134, respirations 26. Throat swab negative. Temperature fell to normal within 72 hours. No patch was seen next morning, but a raw ulcer area was found on right tonsil, persisting up to fourth day. Total dose of penicillin 210,000 units. No complications. Discharged on July 13.

## Discussion

As only 27 cases were treated with penicillin it would be unsafe to draw any definite conclusion from the results of treatment. Still, it would not be out of place to discuss a few points regarding the merits and demerits of such treatment. As no antitoxic serum was used, only early cases or moderately severe cases with slight toxaemia were selected, for obvious reasons. Of the 27 cases 16 were bacteriologically positive, and the remaining 11, though bacteriologically negative, were clinically diagnosed as diphtheria. In the majority the temperature dropped to normal within one to three days. In diphtheria treated with antitoxic serum the temperature usually takes longer to fall to normal; this may, of course, be due to the fact that when large quantities of antitoxic serum (animal serum) are injected, the serum itself prolongs the raised temperature. In all cases the general condition greatly improved within three days, and in those cases in which this was good at the start of treatment it never deteriorated with the progress of the disease. Even the extensive patches affecting the tonsils, uvula, pharynx, and larynx disappeared within five days and the small patches within one to two days. Treatment with antitoxic serum does not heal the patch so quickly; usually it takes a week or more to clear an extensive patch. The bacteriostatic (and probably bactericidal) effect of penicillin may help to clear the patch and thereby quickly remove the source of exotoxin formation. This factor may have a definite influence on the ultimate prognosis of the disease. In all the 16 cases which were bacteriologically positive the swab became negative within six days. This is rather quick compared with the results in antitoxin therapy, where it takes more than a week, sometimes weeks, before the swabs become negative. Extension of the patch after starting the treatment was never noticed. In the present series of cases complications were singularly absent. The circulatory and nervous complications which are the

direct effect of diphtheritic toxin were absent, and so were the respiratory complications which are mainly due to secondary organisms. Tracheotomy was not necessary in any of the cases, though two of them were admitted with slight suction; of course such a result could be obtained with antitoxic serum. Not a single death occurred in the present series.

The mortality rate for diphtheria at the Medical College Hospitals, Calcutta, during the five-year period from 1941 to 1945 varied from 20 to 36%. The lowest (20.3%) occurred in 1941 and 1945, and the highest (36.5%) in 1944. The average mortality was 25.6%—total admissions, 1,429; deaths, 366. In the present series the mortality was nil, but we must keep in mind that of the 27 cases 20 were mild and 7 moderately advanced. From such a small number of cases we cannot assess the value of penicillin in the treatment of diphtheria, but we feel that the subject requires further study. Penicillin cannot replace antitoxic serum in severe cases of diphtheria where immediate neutralization of toxin is imperative, but is it possible to treat early cases with penicillin alone? Diphtheria confers a good deal of immunity to the sufferers who survive. For the production of active immunity we often have recourse to injections of modified toxin such as T.A.F. and T.A.M. or A.P.T. Now if an early case of diphtheria is treated with penicillin alone the infection may be checked, and at the same time the amount of toxin absorbed in the system will be partly destroyed and partly used up as an antigen. Can this toxin act as a stimulus for the production of a better type of immunity? The answer should be "yes," as we know that the best way to acquire immunity is to suffer from the disease in a mild non-fatal form. Incidentally, it may be mentioned that prophylactic immunization is practically not done in India as a routine.

The disadvantage to a child of three-hourly injections of penicillin should be kept in mind. It is distressing to the patient, and the parents will often object. Whether this disadvantage will be overcome by the discovery of a preparation such as penicillin in beeswax and peanut oil or by the injection of a single large dose of penicillin, as has been tried successfully in some cases of gonorrhoea, is still a matter of speculation, but such possibilities cannot be disregarded. Whether penicillin in conjunction with antitoxic serum can reduce the mortality rate and the incidence of complications in severe cases of diphtheria is also a subject that needs intensive study.

The financial aspect must also be considered. We have shown that the average curative dose of penicillin is within the limit of 500,000 units. In this institution an average curative dose of antidiphtheritic serum for a similar group of cases was 50,000 to 60,000 units. When we started to use penicillin therapeutically in the middle of 1945, the drug was scarce and the price varied from Rs.20 to Rs.15 (£1 10s. to £1 2s. 6d.) for each phial of 100,000 units. At the end of 1946 the price was Rs.3/8 (5s. 3d.) for 200,000 units, and the supply was ample. The price of antidiphtheritic serum in the middle of 1945 was between Rs.6 and Rs.7 (9s. and 10s. 6d.) for 10,000 units. The present price is Rs. 7 (10s. 6d.) for 10,000 units. Thus the cost for each case treated with penicillin is Rs.8/8 (12s. 9d.) and for each case treated with antidiphtheritic serum Rs.35 to Rs.42 (£2 12s. 6d. to £3 3s.). We expect the price of penicillin to fall still further. This reduction in cost is at present possible only in an institution where there is a whole-time staff and nurses to attend to the patients. In private practice the patient will have to bear the additional cost of continuous medical attendance for three-hourly injections, careful nursing, and the storage of penicillin, particularly in tropical climates.

**Summary**

Twenty-seven cases of diphtheria treated with penicillin alone are reported: 16 were bacteriologically positive and 11, though bacteriologically negative, were clinically typical cases of diphtheria. Twenty were early and seven moderately severe.

All the cases recovered without developing any complications; the temperature was normal within three days, the throat swabs became negative within three to seven days, and the patches disappeared within two to five days.

The merits and demerits of penicillin in diphtheria and the possibility of future improvement are discussed. Penicillin treatment is undoubtedly more economical.

Typing of the particular strain was not ascertained. Only the clinical aspect of the cases is mentioned.

Our thanks are due to Prof B P. Trivedi for his ungrudging help in bacteriological matters, and to the Superintendent, Medical College Hospitals, Calcutta, for kindly allowing us to use the hospital records in preparing the article and for supplying us with penicillin.

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# A CASE OF MESENTERIC THROMBOSIS COMPLICATING MULTIPLE WOUNDS

## RECOVERY FOLLOWING MASSIVE RESECTION

BY

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*Late Major, Surgical Specialist, R.A.M.C.*

Mesenteric thrombosis is a catastrophe that seldom occurs in men of military age. The following case history has an added interest because its aetiology is difficult to dissociate from the consequence of severe shell wounds sustained nearly four months previously.

### Case Report

A trooper of the Royal Tank Corps aged 32 had enjoyed excellent health until he was wounded in action on Jan. 31, 1944. Severe injuries to both lower limbs necessitated transfusion and prolonged resuscitation before wound toilet was performed on Feb. 2. Secondary haemorrhage arose from an extensive infected wound in the left thigh on Feb. 12, and was controlled by ligation of the femoral artery in Hunter's canal. He then progressed satisfactorily until March 1, when a wound in the neighbourhood of the right knee-joint was found to have caused suppurative arthritis. This demanded wide incisions and splinting with strapping extension.

The patient first came under my care at the 67th British General Hospital on May 5, 1944. His general condition was very satisfactory and no disease of heart or lungs was noted. Temperature, pulse, and respirations remained normal. The plasters were changed. The wounds of the left thigh and leg were healed and a fracture of the left tibia had united. The right knee-joint was still slightly swollen and the drainage incisions were granulating. Quadriceps exercises were performed daily.

*Occurrence of Thrombosis.*—At 4 a.m. on May 27 the patient was awakened by abdominal pain, and after expressing a desire to defaecate, he attempted unsuccessfully to use a bed-pan. Vomiting then occurred, and collapse was evidenced by sweating, subnormal temperature, and a rapid thready pulse. The abdomen moved with respiration and tenderness was limited to a circular area 6 in. (15 cm.) in diameter around the umbilicus. Morphine, 1/4 gr. (16 mg.), was administered, and a plasma drip was started. At 8 a.m., although the degree of

collapse was less, profound pain had greatly increased. It was spasmodic in character, causing him to cry out and to grip his abdominal wall. Generalized abdominal rigidity was noted during the attacks of pain, but in the intervals guarding was only apparent around the umbilicus, there was no visible peristalsis, and the abdomen was silent on auscultation. Lieut.-Col. W. Brindle, R.A.M.C., was called in consultation, and made a diagnosis of mesenteric thrombosis; he recommended surgical intervention. By 10 a.m., after administration of 2½ pints (1.42 l.) of plasma, the patient's general condition improved; his pulse rate was 110 and his blood pressure 98/70.

*Operation.*—Major Ward, R.A.M.C., induced anaesthesia with 0.5 g. of thiopentone and continued with gas-and-oxygen. In addition the tissues of the abdominal wall were infiltrated with 2% "novocain." A midline incision extending 4 in. (10 cm.) above and below the umbilicus was employed, and on incising the peritoneum much blood-stained fluid escaped. Distended coils of chocolate-coloured small intestine with oedematous haemorrhagic mesentery presented and were delivered from the wound. The peritoneal coat of the damaged gut still retained the normal sheen, but the upper and lower limits of devitalization were sharply demarcated. Bowel clamps were applied to healthy intestine 2 in. (5 cm.) above and below the involved segment and resection was rapidly performed. The mesentery was clamped and removed at its base beyond the areas of most intense haemorrhage. In all 91 in. (231 cm.) of gut was removed, and repair was effected by means of an end-to-end anastomosis. The omentum was sutured around the junction and over the mesenteric stump. The abdominal cavity was then mopped dry, and the abdominal wall was closed in layers without drainage.

*Post-operative Treatment and Progress.*—Continuous gastric suction was instituted, and 2 pints (1.14 l.) of whole blood was administered. Injections of morphine 1/4 gr. (16 mg.), were given four-hourly during the first 24 hours. By the following day the patient's general condition was much improved. His haemoglobin was 98%, pulse 120, temperature 100° F. (37.8° C.). Intravenous glucose-saline introducing 2 g. of sulphapyridine during each period of four hours was given by the drip method. Frequent sips of water were allowed, and although the bulk of this fluid was withdrawn by suction it helped to keep the mouth moist and relieved his thirst. The bowel acted satisfactorily four days after operation, and gastric suction was discontinued on May 31. On June 13, after an apparently smooth convalescence, he complained of pain in the right iliac fossa, and next day it was necessary to open a small abscess which had pointed in this region. Subsequently his progress was uninterrupted, and when he was evacuated to England on July 2 his condition was very satisfactory. He found no difficulty in digesting ordinary diet, and his stools were well formed and regular.

*Follow-up.*— On Sept. 10, 1944, I was informed by Maj.-Gen. Ogilvie, who examined the patient at a hospital in England, that no further complications had arisen, and that he appeared fit and well. He was also seen at Liverpool Hospital in 1945. He had made a full recovery and was doing light work.

I am most grateful to Lieut.-Col. W. Brindle, R.A.M.C., for his advice and help in dealing with this case, and to Col. A. Angus, *M.C.*, late R.A.M.C., for permission to publish this paper.

The *Register of Ambulance Stations*, compiled by the Home Ambulance Service of the Order of St. John and the British Red Cross Society, gives the addresses and telephone numbers whence ambulances may be obtained throughout Great Britain. The Home Ambulance Service was set up in 1919 to provide a better means of transport for the sick and injured than those commonly available, particularly in the country, where improvised cabs and wagons often had to be used. It now has 1,000 vehicles in service. The ambulances are provided by the Order and Society, and the responsibility for running, housing, and maintaining them rests entirely with voluntary workers. Thus the smallest possible fee is charged to patients, and those who cannot afford to pay receive free transport. In 1923 the Mobile *X*-ray Service was started, as complement to the work undertaken by the ambulances, to bring *x*-ray units to the bedridden and immobile. In 1926 the work of the ambulance service was supplemented by a first-aid road service; boxes of splints and bandages were set up at the roadside and have proved invaluable to the many victims of road accidents.

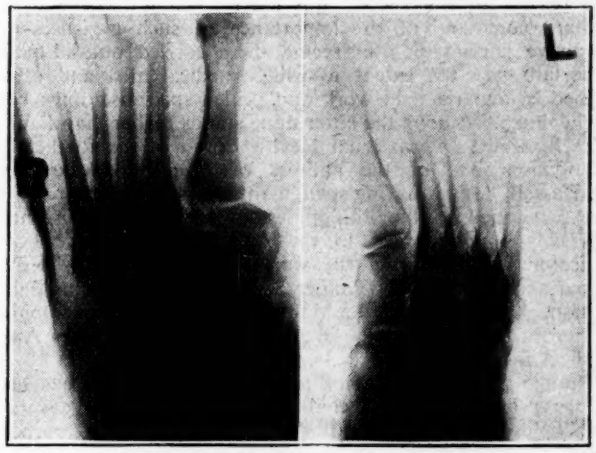
# Medical Memoranda

## A Case of Dislocation of the Metatarso-Tarsal Joints

The following case is of interest because of the rareness of the condition and the radical form of treatment adopted.

### CASE REPORT

Miss A., aged 56, was first seen on Oct. 10, 1945. She fell a short distance down a step on to her right foot, which became swollen and very painful. Tenderness was most pronounced over the base of the first metatarsal. A radiograph showed a complete lateral dislocation of the metatarso-tarsal joints, with a fracture of the first cuneiform at the base of the first metatarsal. Reduction in the out-patient department failed and she was admitted under my care on Oct. 13. The following day a pin was inserted through the metatarsals, and a weight of 7 lb. (3.1 kg.), later increased to 10 lb. (4.5 kg.), was applied, the leg being bandaged to a Braun frame. This produced some distraction but no reduction and, after two days, manipulation under anaesthesia was performed with the weight in place. No real improvement was obtained. The pin was removed, and after the skin had recovered from fairly severe blistering I performed the formal operation of arthrodesis of all metatarso-tarsal and inter-metatarsal joints on Oct. 31. There was considerable fracturing of both metatarsal and tarsal bones which was not obvious in the radiograph. Plaster was applied and by March 16, 1946, the patient was discharged, with no detectable clinical abnormality. Despite the extensive arthrodesis the foot was not less mobile than its fellow.




Radiograph of both feet, Oct. 10, 1945.

### COMMENT

This fracture is not referred to by the majority of authors, but Böhler (1935) mentions various tarso-metatarsal dislocations, of which those involving the first and fifth are the most common. He advises distraction, with a pin through the metatarsals and os calcis. This might have been successful, although I doubt it. The risk in such a method is persistent pain afterwards. If mobility is to be of great importance, as in the subtalar joint, it is a debatable question whether arthrodesis is the best treatment, but in such a case as this it seems to me the ideal treatment, as mobility is minimal at these joints and there is little risk of persistent pain if the arthrodesis is successful.

An interesting case of fracture dislocation of the mid-tarsal and cuboido-navicular joints was reported recently by Jaslow (1946). This produced a rather similar picture, but at a different level in the foot. His case was also treated by fixation, using a screw, with a completely satisfactory result. The very satisfactory result in my case suggests that arthrodesis as a primary measure is the best form of treatment.

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# Reviews

## MANUAL OF MALARIOLOGY

*Practical Malariology.* By Paul F. Russell, M.D., M.P.H., Luther S. West, Ph.D., and Reginald D. Manwell, Sc.D. Prepared under the auspices of the Division of Medical Sciences of the National Research Council. Foreword by Raymond B. Fosdick. (Pp. 684; 238 illustrations. 40s.) London and Philadelphia: W. B. Saunders Company. 1946.

One of the outstanding features in the last war was the successful application of the results of years of research and increasing experience in malaria prevention to protecting our troops in some of the most malarious countries in the world. One reason for this success was the recognition by the higher military command of the importance of such measures and its active participation in seeing them carried out. Equally important was the extent to which medical men and others trained in malaria field work and skilled specialists have been forthcoming. Among the latter none stands higher than Paul F. Russell, of the International Health Board of the Rockefeller Foundation, one of the authors of *Practical Malariology.* Dr. Russell, besides having spent many years in malaria research and prevention in the Philippines, in Malaya, and in India, was chief malariologist to the American Forces in North Africa and Italy during the war. He has been assisted in preparing the volume by Luther S. West, of the Entomological Section, and Reginald F. Manwell, of the Protozoological Section of the Parasitology Division of the United States Army Medical School.

Though published as a military manual the book has been written primarily for the civilian. In 684 pages it covers a wide field, as indeed it must do if it is to serve its purpose, for the practising malariologist has now to be conversant with the many aspects of malaria. Detailed information is what he requires more than anything else on, for example, the parasites of malaria, human, avian, and simian; the wide field of malarial epidemiology; various community indices, which bulk so largely in practical work; and on the different forms of control measures—methods of spraying, dusting, flushing, water covering, pisciculture, and much else. There is also the important subject of the modern synthetic antimalarial drugs and the legal and social aspects of preventive work. The authors deal with all this fully, and give information about practical laboratory and field procedures and technique; the collection of eggs, larvae, and adult mosquitoes; the taking of spleen and parasite indices; the precipitin reaction as used in determining the source of the blood feed of mosquitoes; cultural methods; and other modern laboratory techniques. Giemsa, Leishman, and other staining methods are described, with formulae for making the stains. The section on mounting, preserving, and dissecting mosquitoes is particularly full and up to date, as is that on mixing and distributing dusts and sprays, which includes an account of D.D.T. and its uses. At the end of each chapter is a list of references, in all over 600.

The book is well illustrated with many figures of modern apparatus and excellent photographs of breeding-places, etc. In an appendix are the synoptic tables for identification of the anopheles species of different countries. The book is in fact the most modern and complete account of practical laboratory and field work yet published.

RICKARD CHRISTOPHERS.

## A COMPENDIUM OF MEDICINE

*Modern Management in Clinical Medicine.* By F. Kenneth Albrecht, M.D. (Pp. 1,238; illustrated. 55s.) London: Baillière, Tindall and Cox. 1946.

The curious title does not properly describe this book, which is essentially a one-man encyclopaedia of medicine. The author was formerly director of a U.S. marine hospital, and his book is in the same class as French's *Differential Diagnosis* or Tidy's *Synopsis of Medicine*—the off-duty task of a busy and experienced clinician who is interested in organizing his knowledge and keeping it up to date. It is easy to condemn a book of this kind as all paste and scissors, but the fact remains that Dr. Albrecht has done his self-imposed task surprisingly well.

He begins by considering the case history and then reviews the various systems in detail. Some of the sections, such as those on nutritional deficiency, peripheral vascular disease, the diagnosis and management of venereal diseases, arthritis, endocrinology, allergy, and geriatrics, are much fuller and more practical than is usual in current textbooks. There are a chapter on clinical laboratory medicine and an appendix containing details of therapeutic procedures and diets. Throughout the book there are numerous tables and summaries which provide convenient reference to an astonishing amount of precise knowledge. If you want a sheet of instructions for almost any topic from fever therapy to bed-bug control, from patch-testing to a barium meal and follow-through, you will be almost certain to find it here. There are numerous diagrams and photographs and some excellent coloured plates. The whole book runs to over 1,200 pages in double column yet remains manageable and easy to handle. Book reviewers have so often said "this book should be on every practitioner's shelf" that the statement has become suspect. We will therefore say that with Albrecht at his side the practitioner will never be nonplussed and will always have the most modern information on the problems he meets in his consulting-room and his daily round.

L. J. WITTS.

## MANUAL OF PARENTHOOD

*Parentcraft. A Handbook for Parents and Students.* Second edition. (Pp. 248. 8s. 6d.) London: National Association of Maternity and Child Welfare Centres and for the Prevention of Infant Mortality.

This is a second edition of a publication of the National Association of Maternity and Child Welfare Centres produced first in 1945 to replace *Mothercraft,* which had been out of print for many years. In this book many authorities deal with various aspects of child welfare. The essays are grouped into four parts—the first dealing with the parents, the second with the child, the third with prevention and treatment of the common ailments of childhood, and the fourth with the social aspects of parentcraft, including eugenics, the care of the unmarried mother and her child, and the various social services concerned with childhood.

Much information is crammed into a small space, but in common with so many of such manuals the whole stress is laid on the physical side of the question, and the psychological is somewhat neglected. For example, in the discussion on breast-feeding, except for the statement that the mother should give her whole attention to feeding her baby, there is not a word on the important psychological aspect of the "nursing couple." Even in Agatha Bowley's section it is disappointing to find that she does not make more of the emotional development of the child. Mr. Kenneth Walker deals with some psychological questions in his section on preparation for marriage, but otherwise the information is severely materialistic. If it were not for this unfortunate lack of balance the book could be usefully recommended to all those dealing with the rearing of children.

## TUMOURS OF THE HEART

*Les Tumeurs et les Polypes du Cœur : Etude Anatomo-clinique.* By Dr. Ivan Mahaim. (Pp. 568; illustrated. No price given.) Paris: Masson et Cie. 1945.

Readers of Dr. Ivan Mahaim's fine monograph on lesions of the bundle of His, published in 1931, will welcome his new work *Les Tumeurs et les Polypes du Cœur.* The scanty attention which has been paid to these uncommon conditions is due in part to their incurability, but the author has made a correct diagnosis of tumour of the heart twenty-five times in the past fifteen years, and he feels that there is a possible future for surgical intervention. Gummatous and tuberculous lesions and hydatid cysts have been excluded from his series, which includes not only benign, malignant, and secondary growths of the heart and pericardium, but also the intracardiac polypi.

The polyp of the heart is the commonest of all these tumours and is most frequently found pedunculated in the left auricle, where it may threaten occlusion of the mitral orifice. The author distinguishes the anatomical features of myxomatous polyps and scouts the thesis of Thorel that all these lesions derive from organization of thrombus. He proceeds to describe the clinical features of the three types of mechanical accident

which may occur: embolism by fragments of polyp, obliteration of a cavity by progressive enlargement, and occlusion of a valvular orifice. Among benign non-polypoid tumours of the heart Mahaim has included the rare lipoma and fibroma, and the angioma and rhabdomyoma. The only malignant tumours of the heart among the 400 assembled from the literature are the varieties of sarcoma which show a special predilection for the auricles, while the pericardium is often involved.

The author considers that there is among physicians an insufficient awareness of the circumstances which call for consideration of the diagnosis of cardiac tumour. Unexplained syncopal attacks, unusual variability of physical signs in valvular disease, pericardial effusions without obvious cause, and unexpected arterial embolisms should all bring to mind the possibility of tumours in the pericardium, the heart, or its cavities. Thus arterial embolectomy or the induction of pneumopericardium may be important diagnostic procedures. Just as the clinical separation of the varieties of congenital cardiac defect has been followed by the discovery of surgical methods of treatment so may operative measures be found for the removal of polyps, once the physician has become more skilled and more certain of the diagnosis of these dangerous lesions.

Dr. Mahaim's excellent treatise is essentially for the cardiologist, who will be interested and stimulated by it.

## AN AMERICAN "BURDETT"

*The American Hospital.* By E. H. L. Corwin, Ph.D. (Pp. 242. 8s. 6d. net.) The Commonwealth Fund. London: Geoffrey Cumberlege.

The hospital service is now one of the major industries of the United States. It owns 5½ billion dollars' worth of property ["billion" in the French meaning of one thousand millions], its operating costs are 1½ billion dollars a year, and the principal stockholder is the American public. *The American Hospital*, one of the studies brought out by the New York Academy of Medicine Committee on "Medicine and the Changing Order," is a careful survey of this hospital domain. In the United States there is one hospital bed (or cot) to about every 80 of the population, and every year one person in about ten is admitted as an in-patient. In 1940—the last pre-war year for America—71% of all hospital beds were maintained by Government, that is to say, by Federal, State, county, or city, authorities, and 29% were in hospitals supported by religious denominations, lay voluntary hospitals, and proprietary hospitals. One could quote figures endlessly on the finance of the hospitals and the distribution and utilization of their resources. One point only can be mentioned in a brief review. It has always been a tradition in the United States that, apart from whole-time officers, all physicians, surgeons, and specialists attached to hospitals should be unpaid. The experience gained in hospitals and the prestige of association with them was thought sufficient reward. This practice has held good alike for tax-supported and for voluntary hospitals, and it did not alter even when paying patients were admitted. Of late, however, it has been realized what demands an extensive clinical service in hospital can make, and there is a tendency to pay "whole-time" salaries to the chiefs of these services, with permission to continue a limited private consulting practice outside the hours of duty at the hospital. Hospital affiliation is a *sine qua non* for the surgeon, and to a large extent for the physician. In large cities, in order to maintain a proper standard of organization, hospital staffs are not allowed to exceed certain quotas, so that a high proportion of physicians have no hospital appointments. In smaller communities hospitals give staff privileges to all reputable physicians and surgeons in their area.

The facts and figures in this compilation will have no direct interest for hospital administrators in this country, but much else in the American experience will be found suggestive and stimulating. It is an authoritative and most painstaking work.

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Mr. FRANCIS MITCHELL-HEGGS has now produced a third edition of *The M.B., B.S. Finals*, being a collection of papers set at the London M.B., B.S. examination for the years 1932–45, classified and arranged under convenient headings. In classifying the questions, unnecessary minor subdivisions are avoided by the use of general headings. This booklet is published by J. and A. Churchill at 8s. 6d.

## BOOKS RECEIVED

[*Review is not precluded by notice here of books recently received*]

***Pye's Surgical Handicraft.*** Edited by Hamilton Bailey, F.R.C.S. 15th ed. (Pp. 668. 25s.) London: Simpkin Marshall. 1947.

A large number of illustrations have been added to this well-known manual.

***Traité d'Hygiène.*** Vols. 1 and 2. By A. Rochaix, P. Sédallian, and R. Sohier. (Pp. 1,098 and 1,898. 2,800 francs for 2 vols.) Paris: Masson. 1946.

Intended to be a comprehensive account of the problems of hygiene in cities, factories, hospitals, schools, etc.

***Miracle Drug.*** By D. Masters. (Pp. 191. 10s. 6d.) London: Eyre and Spottiswoode. 1946.

A popular account of the discovery, development, and uses of penicillin; illustrated.

***Oral Diagnosis and Treatment.*** By S. C. Miller, D.D.S., F.A.C.D., *et al.* 2nd. ed. (Pp. 903. 50s.) London: H. K. Lewis. 1946.

This edition includes new material on penicillin, *x*-ray diagnosis, oral bacteriology, and extra-oral fixation of mandibular fractures.

***Belsen Uncovered.*** By D. Sington. (Pp. 207. 8s. 6d.) London: Duckworth. 1946.

A description of Belsen and its inmates by one who was the first British officer to enter the camp on its liberation and the last to leave.

***After-Treatment.*** By H. J. B. Atkins, D.M., M.Ch., F.R.C.S. Third edition. (Pp. 328. 18s.) Oxford: Blackwell Scientific Publications. 1946.

This guide to general practitioners, house-officers, sisters, and dressers contains new material on penicillin and gastric suction.

***Les Gliomes Infiltrés du Tronc Cérébral.*** By G. Guillain, I. Bertrand, and J. Gruner. (Pp. 286. 450 francs.) Paris: Masson. 1945.

After a historical introduction there is a discussion, with many illustrations, of brain-stem tumours characterized by absence of raised intracranial pressure and rapid development.

***Currents in Biochemical Research.*** By various contributors. Edited by D. E. Green. (Pp. 486. $5.00.) New York: Interscience Publishers. 1946.

A collection of papers on biochemistry in relation to medicine, agriculture, and social problems.

***Chemistry of Vitamins and Hormones.*** By S. Rangaswami, M.A., Ph.D., and T. R. Seshadri, M.A., Ph.D. (Pp. 329. Rs. 7-8-0.) Waltair, South India: Andhra University. 1946.

A short account of the chemical composition and synthesis of vitamins and hormones.

***Research and Regional Welfare.*** Edited by R. E. Coker. (Pp. 229. 18s. 6d.) Chapel Hill: University of North Carolina Press. 1946.

A collection of papers presented at a conference on research at the University of North Carolina in 1945. Subjects included are nutrition, research and industry, fisheries, and agriculture.

***The Normal Encephalogram.*** By L. M. Davidoff, M.D., and C. C. Dyke, M.D. Second edition. (Pp. 232. 27s. 6d.) London: Henry Kimpton. 1946.

An account of the technique of encephalography and the information obtainable therefrom; many illustrations.

***Studies in Science.*** Edited by W. C. Coker. (Pp. 375. 18s. 6d.) Chapel Hill: University of North Carolina Press. 1946.

Includes papers on penicillin, quinine, regeneration of lymphatic channels following ablation of lymph nodes, parathyroid cysts, and blood volume changes following acute haemorrhage.

***1946 Year Book of General Therapeutics.*** Edited by O. W. Bethea, Ph.D., M.D., F.A.C.P. (Pp. 443. 21s.) Chicago: The Year Book Publishers. 1947.

Contains chapters on the new sulphonamides, penicillin, streptomycin, influenza virus vaccine, folic acid, and "benadryl."

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## CONTROL AND TREATMENT OF DIPHTHERIA

Diphtheria is an infection of rather insidious onset, characterized by local membrane formation and generalized toxaemia. The clinical disease affects only 5–10% of an unimmunized community among whom the infection is endemic, and deaths or serious sequelae are rare in patients treated with antitoxin within twenty-four hours of onset. If, therefore, the infection always began acutely with characteristic symptoms enabling early diagnosis and prompt treatment diphtheria would have no terrors for layman or doctor, and large-scale artificial immunization would not be needed. As it is, delay in diagnosis allows the powerful diphtheritic toxin to damage heart muscle and other susceptible tissues: before the National Immunization Campaign was started in 1940 this infection caused between 2,000 and 3,000 deaths yearly, and the hospital treatment of 50,000–60,000 affected patients cost over one million pounds. To-day between 50 and 60% of all children aged 1–15 years have been inoculated with diphtheria prophylactic, and the incidence of diphtheria has fallen steadily each year since 1941: the notifications (corrected) are now about one-third of those of pre-war years, and the provisional number of deaths (excluding non-civilians) in 1946 was 444. That immunization has been the main factor in this decline is indicated by the findings that during the years 1942–4 four out of five cases of diphtheria and twenty-nine out of thirty deaths were in unimmunized patients, though the total numbers of immunized and unimmunized children during that period were approximately equal.

These data give no grounds for complacency; nearly one-half of our children remain unimmunized, and every year some 600,000 infants reach their first birthday and require immunization. Furthermore, a baby once inoculated is not thereby made immune to diphtheria for life. In recent years there have been many recorded instances of diphtheria in "immunized" children. The objective in diphtheria immunization must be not only to inoculate 80% or more of our children but to maintain in their blood a level of antitoxic immunity sufficient to reduce to a minimum the risk of diphtheritic infection. The number of queries in our "Any Questions?" column shows that diphtheria immunization still has many puzzling features for both practitioner and medical officer of health. A review of the present position seems apposite.

Diphtheria can occur in inoculated persons for one or more of a number of reasons. In immunization with alum-precipitated toxoid (A.P.T.) the antitoxic titre reaches its maximum about eight weeks after the second injection and then slowly declines, so that a year later there may be a Schick-reversion rate of 2–8%; and in two to five years the Schick-positive rate may be 10–20%. In other words, one out of every five inoculated children may again be susceptible to diphtheria a few years after the first course of immunization. If the child had its first course at the age of one year it may contract the infection when it becomes exposed to risk at school or nursery-school. A boosting dose of 0.2 ml. A.P.T., which will raise the antitoxin titre to a higher level than ever before, should therefore be given as soon as the child begins to mix with other children, and this boosting dose may be repeated five years later. Among older children receiving their first or second boosting dose toxoid antitoxin floccules (T.A.F.) is the prophylactic of choice, since with it there is less likelihood of reactions.

Another cause of diphtheria in immunized persons is the local invasiveness of the *gravis* and *intermedius* types of *C. diphtheriae*, which allows them to produce a throat lesion—diphtheritic tonsillitis—even in the presence of some antitoxic immunity. This is the probable explanation of the outbreak among older girls in a day-school reported in our present issue by Dr. James Fanning. Infection spread although 94% of the girls gave a history of immunization and the Schick-positive rate was only 20%; but it is noteworthy that the severe infections occurred among girls who were Schick-positive, or had not been previously immunized, or, if so, had been inoculated more than five years earlier. Too much reliance must not be placed on the Schick test as a measure of resistance to infection, since negative Schick reactions have been found in persons with as little antitoxin as 1/100–1/500 unit per ml.; it is estimated that the protective level is around 1/30 unit. As a rule infection with *gravis* or *intermedius* strains in Schick-negative or previously immunized persons is atypical, being characterized by follicular exudate rather than membrane, an acute inflammatory reaction with local oedema, and a higher temperature than is usual with diphtheria. It is therefore sound practice to have a bacteriological examination made of any case of follicular tonsillitis, because an atypical diphtheria of this kind, though it may not require antitoxin, is likely to spread infection in school or at home if allowed to go undetected. If an outbreak occurs in a highly immunized semi-closed community probably the best procedure is to carry out large-scale swabbing of contacts, isolate carriers, and give everyone a boosting dose of T.A.F.

A third possible explanation of diphtheria in the inoculated is the use of a poor prophylactic reagent. Thus it has been found that after two doses of T.A.F. the Schick relapse rate may be as high as 30% in two years' time.[1] Considerable variation may occur with different preparations even of A.P.T., though a minimal standard of antigenic potency as measured by the response in the guinea-pig is accepted by manufacturers in this country. Holt,[2] using a purified toxoid precipitated with pure aluminium phosphate, has attempted to eliminate the variables, and it may happen that this new reagent—diphtheria toxoid

[1] Croll, J. M., Spooner, E. T. C., Marmion, M. B., and Booth, W. G., *Monthly Bull. Min. Hlth. & E.P.H.L.S.*, 1945, **4**, 175.
[2] Holt, L. B. 1947, **1**, 282.

aluminium-phosphate-precipitated—will in time replace the more variable A.P.T. The alum-precipitated prophylactics, given in adequate doses of 0.2 to 0.3 ml., are good immunizing agents because they create a depot and thus ensure an effective sensitization of the antibody mechanism, so that when a second dose is given one month or even one year later there is rapid formation of antitoxin. However, although there is nowadays an increasing tendency to begin diphtheria immunization earlier than one year of age—because cases and deaths do occur in infancy—we still do not know how good is the antibody response which the rather immature tissues of the infant can make to an antigenic stimulus. In any event, if immunization of the older children is maintained at a high level the risk of the baby's being exposed to infection will be small.

In the treatment of diphtheria with antitoxin the most important point is to give it as early as possible and by the most effective route, for antitoxin is more prophylactic than curative and cannot undo damage that has already been done by the toxin. There is a steady rise in deaths from diphtheria with each day's delay in treatment. Practitioners are still far too reluctant to give a dose of antitoxin to the "early doubtful case"; with the present refined antisera a dose of 8,000 units, sufficient for the early case, is contained in 1–2 ml., and the risk of reactions is minimal. For the toxaemic case about half the dose should be given intravenously, because absorption after intramuscular injection is relatively slow. No antibiotic can replace antitoxin in the treatment of diphtheria, but, combined with specific therapy, penicillin either sucked from pastilles or preferably given systemically may help to eliminate the organism from the throat more quickly than usually happens. For the mild or early case or for diphtheritic tonsillitis in the immunized penicillin may be used alone, though only the experienced physician will want to take the risk of omitting antitoxin from the treatment of a disease which is essentially a toxaemic infection.

## A FULFILLED MANDATE

U.N.R.R.A. has passed into history with a record of accomplishment in public health on an unprecedented scale and with results of vital importance for the world. The Health Division came into existence at the end of 1943, so that field operations of any magnitude have covered a period of little more than two years and in many countries much less. During that short time medical and sanitary supplies have been provided in great abundance, national health departments resuscitated, epidemics prevented or arrested, and the aided countries started on the way to recovery. The threat of famine and disease, the invariable progeny of war and hardly less dreadful than war itself, menaced the devastated Continent. The wars of former times, relatively local conflicts, were yet followed by pestilences which often lasted longer and took heavier toll of life than the fighting itself; the uncontrolled after-effects of a world-wide war baffle the imagination. Fortunately there were two restraining factors, and U.N.R.R.A. was the minister of both of these. One was the growing sense of international responsibility, fostered by the instincts of self-preservation and compassion; the other was the recent progress in medicine and public health—for example, the introduction of D.D.T.

The Health Division has operated in a dozen or more countries of Europe, carried out a vast programme of relief in China, and dispatched a mission to Ethiopia for the development of indigenous health services there. Assistance in the provision of medical supplies and organization of public health was at first limited to the invaded allied countries that had been seriously damaged and lacked foreign exchange; later it was extended to Italy and Austria, and to some extent to Hungary. In Germany U.N.R.R.A. has had no responsibility for German nationals; its main function has been the care of displaced persons. Food, of course, was the first requirement, and U.N.R.R.A. ensured for the most impoverished countries which were unable to compete with those having foreign exchange assets some share in the supplies available from the great producing lands. Serious undernourishment still persists in several European countries, but without U.N.R.R.A. the situation would have been catastrophic.

The greatest achievement of the Health Division was the prevention of epidemic disease. During the four years of the first world war and the four years after it influenza, typhus, relapsing fever, malaria, smallpox, typhoid, and the dysenteries caused more loss of life than the war itself. An epidemic of louse-borne typhus in half a dozen countries outlasted the earlier war for six years. At that time no international anti-epidemic action was taken except for an effort by the League of Nations to stop the tide in Poland. To-day typhus is only sporadic; cholera has never appeared west of India; smallpox is rare in Europe; typhoid fever, after a serious epidemic in Poland and Germany, is once again under control; diphtheria, except in certain parts of Germany, shows a marked reduction in incidence; plague has gained no foothold, though at one time the occurrence of a number of cases on the Mediterranean seaboard caused anxiety. As for influenza, although the winter waves have come and gone, there has been no pandemic like that of 1918–19. However, U.N.R.R.A. can take no credit for this providential deliverance, for had a pandemic threatened there would have been neither sufficient vaccines nor the means of bringing them to the masses in peril. The *Epidemiological Information Bulletin*, in its final number issued by U.N.R.R.A. from Washington, is scarcely exaggerating, nevertheless, when it declares that public health and medicine come out of this war as the only victors.

Re-establishing the exchange and co-ordination of epidemiological information has enabled danger-spots to be discovered and concentrated action to be taken. Except for the Pan-American Sanitary Bureau, this world-wide network was disrupted during the war; the League of Nations service remained at Geneva, but its communications were strictly limited. U.N.R.R.A. took over the Health Research Unit of the League of Nations at Washington, expanded it into an Epidemiological Information Service, and set up a parallel service in London in the European Regional Office. It also opened by means of its China Mission, through the helpful agency of the China

National Health Department, a service of information about cholera and plague in that country. In addition the British Government last year opened the Far Eastern Bureau. In the early part of 1945 U.N.R.R.A. took over the duties imposed by the International Sanitary Conventions of 1944 governing the precautions against the spread of epidemic disease, the one for maritime and the other for aerial navigation, and became the receiving and transmitting agency of all notifications from the signatory Governments.

Some day, it is to be hoped, a historian will tell in full the story of this first exciting and formidable chapter of relief and rehabilitation. The programme of medical supplies reads like a fairy tale of shipments—over a million pounds of sulphonamide drugs, over 800,000 million units of penicillin, between 600 and 700 million units of insulin, over 1,200,000 pounds of aspirin, over 5,000 million units of diphtheria antitoxin, and over 6 million millilitres of the toxoid. As for D.D.T., the consignments are measurable by the millions of pounds of the powder and the millions of gallons of the solution. Almost all the displaced persons in the camps in Germany have been immunized against typhus, typhoid fever, and smallpox. Within seven months of the entering of Albania, hospital equipment, drugs, and dressings sufficient for 30,000 people were delivered, and enough D.D.T. powder to protect the whole population for a year. In Greece, where tuberculosis was a difficult problem, about twenty dispensaries, started by U.N.R.R.A. tuberculosis teams, are now in operation. In Yugoslavia typhus and malaria controls have been set up, clinical and dietary surveys carried out, and supplies and equipment provided. In the Balkans and Italy the results of an intensive anti-malaria campaign have been spectacular: equipment, including aeroplanes specially devised for aerial spraying with D.D.T., has been handed over to the Governments or to the World Health Organization. Country after country has received not merely largess but consultation, collaboration, and training from selected health experts. U.N.R.R.A. enlisted a professional staff of several hundreds—more than two hundred from the United Kingdom alone. Between 500 and 600 physicians were assigned to the assembly centres for displaced persons or to hospitals and clinics for the general population, and large numbers of public health personnel were employed in an administrative or advisory capacity and in field work in their specialties. Dr. Andrew Topping, Director, Medical Division, has gratefully acknowledged the help of local authorities in releasing public health officers for this work notwithstanding the pressure on their own departments.

The Health Division has now handed over the administration of its functions, apart from those relating to the health of displaced persons, to the Interim Commission of the World Health Organization, with its headquarters at New York City and its Epidemiological Information Service at Geneva. The Commission will also assume the functions of the International Office of Public Health, which worked from Paris until it was disrupted by the German occupation. The International Refugee Organization will eventually take over the care of displaced persons; until they are ready U.N.R.R.A. medical, dental, and nursing staff will continue to be responsible, and it is expected that the majority will be absorbed into the new organization. Other transferred activities will be the training of health personnel by means of fellowships and teaching abroad, advice and assistance in the control of tuberculosis and malaria, and the sending of expert missions to countries with special needs. The medical and administrative teams in Britain and the United States of America hand over their mandate with satisfaction and the expectation of harvests to come. Theirs has been a great and humane achievement.

## A NEW TREATMENT FOR POST-OPERATIVE PULMONARY ATELECTASIS

Increasing knowledge of the pathogenesis of post-operative pulmonary complications and of methods of prophylaxis against them has led to diminution in their frequency; but it will always be necessary to perform operations on unfavourable subjects and at unfavourable times, and hence post-operative atelectasis may be expected to continue to present a therapeutic problem. Grandstaff[1] has recently reviewed the respiratory complications in a series of 2,704 operations at the Kansas City General Hospital. Some of his figures are surprising; for instance, in a series of 19 patients anaesthetized with nitrous oxide–ether sequence there were 10 cases of post-operative pneumonia, with 2 deaths. The mortality from pneumonia in 100 cases anaesthetized with cyclopropane–ether was 1%, and in 102 receiving spinal anaesthesia and nitrous oxide it was 3%. The total incidence of respiratory complications in the whole series was 2.6%, and of pneumonia 1.8%; and of the 51 patients with pneumonia 24 died. Grandstaff points out that high oxygen concentrations in inhalational anaesthesia, as are employed with cyclopropane, favour the occurrence of atelectasis; and it is his practice to give nitrous oxide during the last few minutes of cyclopropane anaesthesia to minimize this effect. He claims dramatic results in post-operative atelectasis, before pneumonic changes have occurred, from the application of 5% to 10% cocaine to the pharynx and pyriform sinuses as if in preparation for bronchoscopy. He states that the effect is not produced only by the stimulation of cough, because the same results were not obtained by merely applying a swab moistened with saline solution to the throat. He presents reports of five cases in which a post-operative atelectasis cleared up dramatically after this procedure had been tried, and states that since he introduced this method it has not been necessary to resort to other procedures for the relief of the atelectasis. It is clear that the evaluation of a procedure which inevitably produces severe coughing as a treatment for atelectasis is difficult. Grandstaff suggests that cocainization of the throat acts by producing a reflex relaxation of the bronchial musculature, and although this explanation may seem a little far-fetched it is at least feasible. The method seems to be worth a trial.

## POISONING BY IRON SALTS

Copper and manganese belong to the group of trace elements without which plants do not flourish but which are deleterious in excess. The same probably applies to animals, but on a normal diet and with normal absorption there is no question of either deficiency or excess. The position is very similar for the much larger amount of iron required, apart from the deficiency which may arise from

[1] *Arch. Surg.*, 1945, **51**, 237.

loss of blood. It is now the custom to add copper and manganese to the preparations of iron needed when there is evidence of iron-deficiency, and this seems to make medication with iron more efficient. However, preparations of iron are to a certain extent toxic, and the question arises whether such preparations with small quantities of copper and manganese, though more efficient, may not at the same time be more poisonous in excessive doses or in those who are sensitive.

Dr. Gilbert Forbes has seized the opportunity presented by those unfortunate accidents which arise from the experimental attitude of young children to materials they can swallow. He describes (p. 367) how two children, aged respectively 3 years and 3 months and 1 year, swallowed a preparation consisting of ferrous sulphate with copper sulphate and manganous sulphate. The elder child swallowed about 50 and the younger about 30 tablets; each tablet contained 1/75 gr. (0.87 mg.) of the copper and of the manganous sulphate for each grain of ferrous sulphate. Both died. In neither case was there evidence of excessive absorption of copper or manganese. The elder boy showed some jaundice, and in both there was evidence of necrosis of the liver and of other organs. From experimental work on animals Forbes concludes that the toxic agent is essentially ferrous sulphate and that the copper and manganese are in too small a proportion to contribute to the toxicity of the relatively enormous doses taken.

It is well known that young children are much more vulnerable to certain drugs and poisons than are adults and that they absorb many substances more freely. However, Forbes's results do suggest that overdosing with iron preparations is undesirable, especially in individuals who are sensitive. Among metallic poisons those that are relatively easily absorbed are regarded as the more poisonous, but, granted that the metal is absorbed, there appears to be no essential difference in their toxicity except in the case of arsenic. "BAL" (British anti-lewisite) was introduced as an antidote for arsenical war gases and was later applied to the treatment of arsenic-poisoning.[1] It has since been used successfully by intramuscular injection in acute mercurial poisoning.[2] There is no obvious reason why "BAL" should not be useful in other metallic poisonings, particularly where the metal has a characteristic sulphide.

## UREA AND URETHANE AS ANTISEPTICS

Urea was first applied to wounds chiefly as an aid to cleansing and the dislodgement of sloughs. Later it was combined with sulphonamides, with which, according to some American authors, it has a synergic action. The effect of urea and of urethane, which has been similarly used, alone and in combination with sulphonamides has been thoroughly investigated *in vitro* by L. Weinstein and Alice McDonald[3] with a view to explaining discrepancies in earlier findings.

Each of these substances has a direct action on bacteria, that of urethane being about four times the more potent. Thus 2% urethane or 8% urea inhibits the growth of most bacteria; concentrations of 10% and 20%, respectively, are bactericidal. A remarkable feature of this action is that Gram-negative organisms, including so intractable a species as *Ps. pyocyanea*, are more susceptible than Gram-positive. The most resistant common species is *Staph. aureus*. Like urea, urethane increases the solubility of sulphonamides, another effect which has been urged in favour of both of them. In combination with sulphonamides there is at least an additive if not a synergic effect. Inhibition of growth is achieved by concentrations of urea or urethane, on the one hand, and sulphonamides, on the other, which when acting alone are ineffective. There is also some evidence that these two substances counteract the anti-sulphonamide effect of *p*-aminobenzoic acid, but the concentrations required are relatively so great and the effect so transient that this seems unlikely to be a factor in any success which the combination may have as an antiseptic. Weinstein and McDonald go further and suggest that urea and particularly urethane, if used in sufficient concentration, have so pronounced an independent action on bacteria that the addition of a sulphonamide may not have much value for the purpose of wound treatment. They propose that a mixture of urethane and penicillin should be used for treating mixed infections in wounds. Urethane serves to suppress coliforms, which are not only resistant to penicillin but may destroy it; the penicillin deals with staphylococci, which are more resistant to urethane. That this combination will suppress the growth of both organisms together they have proved under *in vitro* conditions. Whether the liberal application of urethane may have any harmful effect is not discussed. Apart from this possibility the method seems worthy of a trial.

[1] *British Medical Journal*, 1946, 1, 240.
[2] *J. clin. Invest.*, 1946, 25, 557.
[3] *J. Immunol.*, 1946, 54, 117, 131, 145.

## FELLOWSHIPS IN PLASTIC SURGERY

Sir Simon Marks has established three fellowships per year in plastic surgery, each to the value of £740 per year for two years, tenable at Queen Victoria Hospital, East Grinstead, Sussex. These Fellowships will be known as the "Simon and Matilda Marks Fellowships in Plastic Surgery."

This magnificent gift is undoubtedly a great contribution to surgery and will be warmly appreciated by the medical profession. The Queen Victoria Hospital, East Grinstead, has grown remarkably during the war. It has benefited by gifts from Canada, Australia, New Zealand, and South Africa, with the result that the buildings and equipment are of the most modern type. The recent addition of the American surgical wing, opened by the Queen last year and representing the memorial gift of the British War Relief Society of America, went far to make this plastic centre the best in the Empire. Sir Simon's gift will ensure that the facilities at East Grinstead will be used in postgraduate education. He is to be congratulated upon his far-sighted generosity.

## "DOCTOR" SIGNS ON CARS

During the war the movement of cars had to be greatly curtailed, and a traveller was likely to be stopped and asked by the police whether his journey was really necessary, particularly if an air raid was in progress or troops were on the move. In such circumstances the "Doctor" sign on the windscreen afforded valuable protection against unnecessary delays in "doing the round." The need for it now, however, has vanished with the conditions that once made it a justifiable practice. It has been suggested that the police might relax parking regulations and not bother the owner of a car standing for an hour or more at the kerb, but medical men are not entitled to any special immunity from the law. Though to display the sign may be convenient, it may come to be regarded as a form of self-advertisement. It has been suggested that some medical men do so regard it. To avoid any suspicion of this, medical men should discontinue a wartime habit.

# Correspondence

## First Things First

SIR,—If there are insufficient hospital nurses Mr. Bevan's prophecy that we shall soon have the finest medical service in the world is unlikely to be fulfilled. Thousands of hospital beds have been closed down for want of nursing staff, and the remainder are understaffed, giving rise to overwork and more resignations from the nursing service. All reforms are doomed to failure unless suitable accommodation can be provided for nurses. Cannot Mr. Bevan persuade his right hand—i.e., the Minister for Housing—that it is essential to help his left hand —i.e., the Minister of Health? Without such help the hospital service of the country is bound to fail. In peacetime women will not agree to live in buildings designed like old-fashioned barracks, nor are they prepared to sleep two in a room. Few hospitals to-day have sufficient accommodation for nurses in order to start eight-hour shifts, and some have insufficient accommodation even for two shifts. The subject of accommodation is very urgent. The Government has realized that there is an electricity shortage, and it will take two years to build a power station; but it takes four years to train a nurse.—I am, etc.,

London, W.1. MALCOLM DONALDSON.

## Groundnuts in East Africa

SIR,—The leading article on groundnuts in East Africa (March 8, p. 301) points out the benefits which the Government scheme bids fair to confer on this country and the African. Too long has it been assumed that vast areas of East Africa are of no value to mankind and fit only to be relegated to big game and the tsetse fly.

The largest block of land selected, and that where operations are to be commenced, lies in the Southern Province of Tanganyika, long noted for sleeping-sickness, increasing inroads of the tsetse fly, and the abundance of big game. In 1942 no less than 572 elephants were killed in that province.

Inferences drawn from fly clearances on the west coast, where conditions are dissimilar, will be of little value in Tanganyika. But in S. Rhodesia, by the natural means of depriving the fly of its food supply, the Government has already rid nearly 4 million acres of "fly," and the clearance of another 2½ million acres is nearing completion. Settlers, with their cattle, are already established on land previously resigned to game and "fly." Under the direction of Mr. Chorley, the Government entomologist, native hunters have destroyed the game; the "fly" has been starved out.

In his annual report for 1942 the Provincial Commissioner, S. Province, Tanganyika, stated that "vermin, in which term are here included elephant, hippopotamus, and other game, continue to take great toll of the African's crops." It may be assumed that the business men in charge of the groundnut scheme will not permit the wreckage of their works by these animals. But no benefit will accrue to the African, except possibly those actually employed on the groundnut scheme, if the game (and "fly") are merely driven away to native-occupied land. Only aggravation of the state of affairs reported by the Provincial Commissioner can result from such action. The game must be destroyed, as it has been, with such beneficial results, in S. Rhodesia.

All administrative officers undergo anthropological training, and, better still, acquire an intimate knowledge of native life and customs in their daily work. There is no need, therefore, for the dispatch of "anthropological experts," who would only be beginning to understand the local natives by the time that the extra fat was being consumed in this country.—I am, etc.,

Bournemouth. J. B. DAVEY.

## Arsenical Encephalopathy

SIR,—It was with great interest that I read the article by Drs. G. Hipps and R. Goldberg on arsenical encephalopathy (March 8, p. 296).

While serving as a V.D. specialist in a large V.D. hospital in Bengal I saw over seventy cases of arsenical encephalopathy, all of them proved post mortem. During this time—August, 1943, to June, 1944—many other hospitals in India reported large numbers of cases of arsenical encephalopathy.

The case reported was very typical in its origin, with its aura, but we sometimes noticed that the man had complained of slight headache, and of feeling unwell after his previous injection. These symptoms were thought to be of great significance; their case is also typical with its convulsion, but we did not notice tongue-biting, and almost always we noticed athetoid movements, which do not seem to have been present in the case reported. The high rise of temperature before the end is also typical, and their post-mortem findings are just as we always found in India. I quite agree with the authors on the unusual feature of their case. First, the long time interval before the condition developed. All our cases occurred between the second and fifth injection, nearly always after the third. Death was much more rapid in our cases and sometimes occurred twenty-four hours after the first symptoms. Thirdly, in our hospital we had no authentic case of recovery from arsenical encephalopathy; death occurred in all cases. Our cases were all of early syphilis; no cases occurred in congenital syphilis. The treatment of early syphilis was then 0.3 or 0.45 g. N.A.B. with 0.2 g. bismuth; then 0.6 g. N.A.B. after 5 days; and then 0.6 g. N.A.B. and 0.2 g. bismuth weekly. Our treatment of the encephalopathy was very similar to that carried out by Drs. Hipps and Goldberg.

Another important feature was that most of the cases were Indians, and I can only remember three cases in Europeans. Furthermore, the Indians were usually Southern Indians, in whom there is often a dietary deficiency in protein, and it was suggested that this could have been a contributory factor.—I am, etc.,

London, W.5. J. M. H. MCMURRAY.

## London Clinic for Epileptics

SIR,—Many of your readers are interested in one aspect or another of the difficult problem of the epileptic. These unfortunate people often find it hard to secure a place in industry even with the assistance of the D.R.O.s at the employment exchanges. A considerable number are known to be drifting about in the community in need of medical advice or of help with their social problems.

In an endeavour to meet this situation a clinic has been established by the London County Council at St. John's Hospital, St. John's Hill, Battersea, on Wednesday afternoons at 2.30. The medical officer in charge is a senior officer seconded from St. Ebba's Hospital, and an experienced psychiatric social worker is in attendance. The clinic works in close association with the employment exchanges and with the colonies for epileptics, and it is understood that excellent results are being obtained. Doctors in private practice or on hospital or clinic staffs who wish for advice on epileptic patients living in London should make an application to the psychiatric social worker at the hospital.—I am, etc.,

ALLEN DALEY,
Medical Officer of Health.

London, S.E.1.

## Anaesthetic Apparatus and Cross-infection

SIR,—Writing in 1873 Skinner made the following observations on the use of anaesthetic apparatus:

"There is no one inhaler, my own excepted, where every patient is not made to breathe through the same mouthpiece, tube, and chamber. . . . Sweet Seventeen . . . is made to follow another whose nasal and pulmonary mucous membrane, leave alone the cutaneous surroundings of the mouth and nares, may be exhalant of all odours but those of purity and innocence." [1]

Reading this recently reminded me of attempts made by the theatre sister to clean the rebreathing bag of our Coxeter Mushin apparatus, as she "thought it a nasty habit for all the patients to breathe out of this." A search of the literature revealed only one reference to the possibility of cross-infection from anaesthetic apparatus, and that did no more than mention the possibility of the soda lime acting as a bacterial filter.[2] I therefore thought it worth while to record some actual experiments performed on our apparatus. Already a swab had been sent to the laboratory from the inside of the breathing bag.

This was returned: "The swab contained a green mould. Culture: heavy growth of haemolytic *Bact. coli*."

It is my practice not to switch on the soda-lime absorber for the first few minutes of an induction, so I next took the following swabs: (1) from the expiratory valve before absorption and ether: sparse growth *Bact. coli*; (2) from the inspiratory valve before absorption and ether: one mycelial colony only; (3) from the expiratory valve after a half-hour's absorption and ether: sterile; (4) from the inspiratory valve after a half-hour's absorption and ether: sterile. This seemed reassuring, so I used the apparatus for a whole morning's work—the last two cases being short gas-and-oxygen anaesthetics in which I used the Mushin apparatus without absorption, and again I took swabs from the valves and absorber ends of the corrugated tubing. These results were: (1) expiratory valve: a few discrete colonies of pneumococci; (2) inspiratory valve: sterile after 24 hours' culture. I may add that the face-pieces are immersed in biniodide solution between cases, but the corrugated tubing is merely hung up when not in use.

It seems safe, therefore, to deduce that there is no danger of cross-infection from bacteria in a modern anaesthetic apparatus using soda-lime absorption, and it even seems safe without the use of soda lime. There is still the possibility of virus cross-infection, and this is a matter which is perhaps worthy of investigation.—I am, etc.,

Worthing. F. R. GUSTERSON.

REFERENCES

1 *British Medical Journal* (1873), **1**, 353: quoted in *Development of Inhalation Anaesthesia*, by B. Duncan: Oxford University Press.
2 Magath, T. B. (1938). *Curr. Res. Anaesth.*, **17**, 215.

## Psycho-analysis

SIR,—In your excellent account in your obituary column (March 8, p. 316) of Pierre Janet's record, you state that Freud's psycho-analysis produced better results than those of Janet. Is there absolute proof of this assumption? Janet's work, as you so aptly described, was on the lines of hypnotic suggestion, whereas Freud by his psycho-analysis reduced the complex regressions apparently by his reduction of abreaction. In the last generation of such giants in hypnotic treatment alone, where no psycho-analysis was used but only hypnosis, how do you account for the remarkable results attained at the Nancy School by Liebault and Henri Bernheim, also Wetterstrand of Stockholm, who used hypnosis alone? Does it not prove that exalted suggestibility alone may reach the deep centres? Bleedings were produced, rapid pulses were slowed down, and in Wetterstrand's work in a case of paroxysmal tachycardia with the pulse running at nearly 200 beats per minute, sphygmographic tracings showed the beats, under hypnotic suggestion alone, slowing down to 80 per minute. Bernheim produced blistering under hypnotic suggestion, and Liebault practised among the poor at Nancy for 30 years using hypnotic suggestion alone, and his results lasted and were excellent. This is all a true and strange paradox, and it would be interesting to have your comments on this where no Freudian methods were used.—I am, etc.,

Southall, Middlesex. JOHN R. O'BRIEN.

## World Food Council

SIR,—With reference to the opening statement in the annotation on the above (Feb. 8, p. 228) it has to be emphasized that questions arise at once where the food ought to be grown and whether it is necessary for poor nations to increase their purchasing power in order to buy their food from abroad. Advocated by high-powered emotional appeal regarding "starving" nations, the "World Food Board" plan aimed at stabilizing prices by means of buffer-stocks and at disposing, profitably for the producers, of unmarketable surpluses.

To deal with the last point first: in the plan the "starving" nations were in reality to be used merely as dumps for excess food after it had been paid for by a third party, obviously to the great benefit of privileged countries and persons—the professional producers-for-sale of food, a very small part indeed of the world's population. The aid of "starving" nations, with a population mainly of non-industrialized peasants and abundant cultivable land, could, however, be enlisted in their own interest to solve their underfeeding problem for good and all by their being educated and even constrained to grow their own food (more likely to be of a suitable nature) on the spot—a different proposal of course from that of using large-scale loans as a means of developing backward countries—backed up to the hilt, moreover, by the results obtained by amateur plot holders during the war.

For the professional food-producing countries the solution of their long-term problem lies of course in adapting supply to demand and in diversification of industries. Buffer-stock measures, that textbook commonplace and the present case cure-all, are a purely palliative makeshift contrivance, applicable only internationally for the temporary alleviation of the effects of depressions. Their use internationally is impossible because consumers' interests are diametrically opposed to those of producers. They are, moreover, an example—a hidden one—of that universally condemned expedient, the export subsidy, the international variety of which would add insult to injury by requiring foreign industrial consumers to provide, at considerable expense and loss of bargaining power, the major part of the funds for the subsidy. Buffer-stock schemes, moreover, are liable to other disabilities. Enormous expenditure would be involved in carrying them out. Where a commodity is produced at home and abroad the existence of tariffs to protect domestic production would prevent the establishment of a "world food price," the essential basis for their formation; stocks would deteriorate on storage; and, finally and worst of all, because of guaranteed prices to the producer there would be overproduction of food with unmarketable surpluses, a situation incapable of being met by production-control measures in view of the inelasticity of supply and demand. We are not dealing here with philanthropy, and on a purely economic basis the building up of reserves to meet possible famine situations ought to be the obligation solely of those nations subject to such hazards.

The development by Sir John Boyd Orr of the "World Food Board" plan from the suggestion by Mr. S. M. Bruce in 1935 of a "marriage between nutrition and agriculture" and the composition of the Preparatory Commission to inquire into its soundness could be discussed in some detail with considerable advantage. Further remarks, however, will be confined to observations on a recent occurrence which in many respects supplies an up-to-date summary of the situation. In the House of Commons on Feb. 6 Mr. H. Wilson, M.P., reported on and supported the findings of the Preparatory Commission. Mr. Richard Law, M.P., suggested that both Mr. Wilson's speech and the report buried Orr's proposal of a "World Food Board"; whereupon Mr. Wilson interrupted to say that Sir John Boyd Orr was "highly delighted" with the report. The obvious comment is that somebody has queer ideas of relevancy and refutation in a reply, and that somebody else appears to be remarkably easy to please and to be liable to self-persuasion, as the quotation from the *Observer* (see *B.M.J.*, Feb. 8, p. 228) also demonstrates.—I am, etc.,

Aberdeen. J. P. MCGOWAN.

## Use of Penicillin Pastilles

SIR,—Dr. T. H. Manners Kerfoot states (Feb. 1, p. 197) that "stomatitis after oral penicillin may be due either to the penicillin or the sucrose base." He argues that, as the sucrose base is used in other pastilles not containing penicillin without causing stomatitis, the penicillin must be the cause.

There is an alternative explanation, that both penicillin and sucrose base are required to produce stomatitis. I believe this to be the true one for the following reasons: (1) As Dr. Alexander MacGregor (p. 197) points out, in the original work on penicillin pastilles we treated over a thousand patients without causing stomatitis, the base in this case being soft and viscous. (2) If sufficient penicillin is given by the systemic route it is secreted in the saliva, producing the same changes in flora of the mouth as are obtained by local treatment. These patients do not develop stomatitis. It would appear, therefore, that penicillin alone or penicillin in a soft base does not cause stomatitis. If, however, patients having systemic penicillin at the rate of approximately one million units a day are given boiled sweets to suck they develop the condition.

The clinical evidence supports this suggestion, penicillin-stomatitis starting in the areas receiving the most trauma, namely the tip and sides of the tongue, even in the later stages the more protected areas tending to escape. Though the pastilles and the trochisci both contain sucrose, the trochisci contain the greater quantity. It may be that continuous sucking of such a base alone would produce stomatitis, the importance of the penicillin being merely that more intensive treatment is prescribed when penicillin is an ingredient than when it is not. While Dr. Kerfoot's observations suggest that this is improbable with the lozenges that he prepares it is conceivable that the continuous abrasive action of sucrose crystals on the buccal mucosa, supplemented, perhaps by the osmotic effect of a hypertonic solution, may be sufficient to cause stomatitis in the absence of penicillin. Observations on the point are desirable.

Quite apart from the relationship between the trochiscus and stomatitis there are other grounds for criticism. Dr. MacGregor stressed the importance of a viscous base if the maximum effect is to be obtained on the tonsils, quoting the references for his opinion. This being so I will merely state that I am in complete agreement with him. The trochiscus is unsuitable for use in plastic surgery of the mouth because it is so hard that the patient will not tolerate it, and even if he can be persuaded to maintain it in a less sensitive part of his mouth the base accumulates in intra-oral wounds and has to be removed manually.

In conclusion I would stress that I consider the trochiscus penicillini highly unsatisfactory for the reasons stated, and hope that the manufacturing companies will soon devise a more suitable base. Until then, I believe the original pastille devised by Dr. MacGregor and myself to be the most satisfactory, in spite of its limited keeping properties.—I am, etc.,

London, W.C.1. DAVID A. LONG.

## Delayed Reaction to Penicillin

SIR,—The recent article by Dr. A. I. Suchecki (Dec. 21, 1946, p. 938) on allergic reactions to penicillin prompts me to record a case where the reaction was unusually delayed.

### CASE REPORT

At Forest Isolation Hospital, Mansfield, a girl of five years, suffering from bronchopneumonia following whooping-cough, received 400,000 units of penicillin in four-hourly doses from Dec. 15-19. The penicillin used was an ordinary commercial brand in aqueous solution, injected intramuscularly. Rapid improvement was followed by a slight relapse ten days later, and sulphathiazole 8 g. was given orally from Dec. 30 to Jan. 4.

On Jan. 27—i.e., 39 days after cessation of penicillin and 23 days after cessation of sulphathiazole—she developed a raised, pink, blotchy rash, generalized in distribution but most marked over the sites of penicillin injections; oedema, especially of the hands, lips and eyelids; pruritus of moderate degree; pyrexia of 101°-103° F. (38.3°-39.4° C.); and considerable bronchospasm, which was temporarily relieved by adrenaline. There was no arthralgia, no hydrarthrosis, no lymphadenopathy, and no jaundice, and the urine was normal in all respects. The features which persisted longest were the oedema (which subsided on Feb. 1) and the rash (which disappeared on Jan. 31). On the neck the fading of the urticarial eruption coincided with the appearance of a number of petechiae.

The most delayed penicillin reaction previously known to me was Dr. J. N. Turnbull's case (Jan. 18, p. 111), where the reaction occurred 35 days after cessation of parenteral treatment. A delay of 39 days before the appearance of an allergic reaction is certainly most unusual, yet the features were unlike those of a sulphonamide drug rash and were completely in line with those of penicillin reactions as described by Suchecki and others.—I am, etc.,

Mansfield. I. A. G. MACQUEEN.

## Endocrines in Gynaecology

SIR,—The fact that the action of hormones depends not only on the hormones themselves but also on the mode of reaction to them of the target cells is well known in endocrine biology, and is bound up with the general conception of "biological field"—a conception which we owe to the brilliant work of J. Needham and C. Waddington. Albright coined the characteristic expression "Seabright bantam syndrome." The male Seabright has female feathering, which is attributed not to any predominance of female hormone in the bird but to the special reaction of its feathers to male hormone. This conception enables us to understand much of the physiopathology of endocrine diseases.

Mr. Aleck Bourne (Jan. 18, p. 79) has rightly stressed the importance of this biological principle in practice. Endocrine diseases are not diseases of one of the six classical glands of internal secretion but disturbances in the balance of a whole system of constitutional or metabolic regulation composed of the genes, endocrines, neurovegetative system, psycho-associational cortex, certain environmental factors, and the reactivity of the cells—the "competence" of the biologist. Thus endocrinotherapy is not the sole method of treatment of "endocrine diseases." On the contrary, its one-sided application may do harm by upsetting the balance of the system of constitutional regulation, as shown by the bad effects of an exclusively endocrine treatment in certain eunuchoidisms in the young and by the disasters of attempts at rejuvenation with testicular organotherapy.

At the Annual Meeting of the B.M.A. at Oxford in 1936 I opened a discussion on physical methods in endocrinotherapy, in which I stressed the importance of physical medicine in modifying the balance of the system of constitutional regulation and thus its superiority, in certain endocrine diseases, over organotherapy. In endocrine as in all other diseases we deal with the complete psycho-physical personality. It is curious that psychiatry and endocrinology, the two branches of medicine which have contributed to our modern concept of total personality in disease, seem to revert to the comfortable one-sidedness which they have been fighting; psychiatrists stress unduly the psychological factors at the expense of the organic factors, while endocrinologists seem to dwell exclusively on the hormones with which we have been flooded.—I am, etc.,

London, W.1. A. P. CAWADIAS.

## Endocrine Receptors in Relation to Cancer

SIR,—No doubt the idea that an endocrine stimulus or impulse must be received as well as transmitted has occurred to many, though I agree with Mr. Aleck Bourne (Jan. 18, p. 79) that it has not been given the prominence which Mr. Bourne rightly, I think, considers it should receive. The idea, however, was the main point of a paper entitled "A Theory of Cancer" published in the *Lancet*, 1920, **2**, 1,298. It did not attract any particular attention as far as I know, and I only remember it because I wrote it and because I have never ceased to think of endocrine glands in general as structures which not only transmit a particular kind of energy but whose effectiveness depends on the proper reception of the message transmitted. I suggested, in fact, that sensitivity to hormone messages was a necessary function of every normal cell of every tissue, and I endeavoured to trace the sequence of events that must occur in a group of cells in which this function was being imperfectly carried out as the result of a failure to cope with an excessive demand on the regenerative capacity of those cells. I was not thinking of special hormones but of what I called the "co-ordinating hormone," a hypothetical hormone whose existence it seemed to me to be a logical necessity to assume, as in no other way could the harmony of growth and function of all normal tissues be explained.

I venture to recall these points now as a comment on Mr. Bourne's paper because I thought that the idea of receptors (or, as I called it, cell sensitivity) could be applied to Dr. A. Paine's then recently published paper (*Lancet*, 1920, **2**, 692) on the origin of cancer. Dr. Paine's views may be epitomized in the following quotation from his paper: "We have thus traced cancer to its source; it springs from a degenerate cell, a cell that has in some manner been damaged or injured, and from such a cell all cancer cells are descended." In my paper I attempted to show that cells so degenerated gradually failed in all their functions, both special and general; I tried to make the point that this failure must include the failure to respond to the message of the co-ordinating hormone and that failure in this function must inevitably result in cancer.—I am, etc.,

Leicester. T. C. CLARE.

### National Health Service

SIR,—Having read no constructive criticism of the National Health Service I offer the following. At the plebiscite I voted "No," because I am against any form of compulsion, unless it be in war or for the maintenance of peace, law, and order, or in cases of unsound mind. Under the present Act of Social Security and National Health everyone is compelled to contribute a certain weekly sum, for which in return he will receive certain benefits. This should, in my opinion, be voluntary. The insurance company to whom premiums are paid should be a matter of individual choice, State or private.

A health service should be organized by the State for the benefit of those who pay their premiums and for those who are unable to pay at all. Consulting rooms, hospitals, etc., should be provided and staffed. Vacancies on these staffs, some whole-time, some part-time, should be filled by advertisement in the usual manner. Pay and conditions being good, there would be ample people to fill them. In addition, these State-controlled hospitals would offer accommodation for all, with three classes of luxury, those not in the State insurance scheme paying the usual fees and anyone wishing more luxurious accommodation paying the excess—the treatment in every hospital being carried out by its own staff. Private hospitals and nursing homes would remain as at present, as also would the public health services.

Medical teaching would be provided at the State hospitals and in the consulting rooms, in collaboration with the universities and colleges. Each doctor would be able to choose to work in private practice or part- or whole-time in some branch of the State Service.

I cannot in such a short space give a scheme in complete detail, but if it is worth doing it should not be too difficult. There is still time to start again and to produce complete medical facilities for all, based on the principles of freedom, and giving everyone the opportunity of being responsible personally for the care and future of himself and his family. It is only by giving such responsibility to the individual that the moral fibre of the country can be saved.—I am, etc.,

Southsea, Hants. J. T. FURNIVAL.

### Two Negotiating Committees, Past and Present

SIR,—The strongest impression I took away with me from the recent Special Representative Meeting was the lack of confidence shown in the Negotiating Committee. One resolution, which was carried, asked them to resign; others tried to impose terms of reference upon the new Negotiating Committee; and many more asked the new committee to report back frequently. What is wrong with the old and new Negotiating Committees? It is not the individual members that are at fault; it is the constitutional set-up that makes it unsuitable to carry out the functions invested upon it.

The B.M.A. has been recognized as the only body capable of negotiating on behalf of all shades of medical opinion. It represents the Royal Colleges, the consultants, medical officers of health, the Medical Women's Federation, and the general practitioners. Therefore the first Negotiating Committee, which had to discuss mainly the fundamental principles of the Act, should have represented the B.M.A. only and no other body. The committee would then have been bound to press upon the Minister the various resolutions passed by recent Representative Meetings with overwhelming majorities. Instead, we have had a Negotiating Committee divided among itself and giving the Minister the impression that the doctors were not united. The Negotiating Committee should have comprised men of talent and vision but nevertheless representing the majority view of the B.M.A. instead of men with violent sectional interests and conflicting views. How comes it that the Royal Colleges, which are already represented by the B.M.A., should have eight representatives of their own on such a body? Surely this is out of proportion to their political influence on the profession.

Then, a second Negotiating Committee should have been formed, similar to the present one in constitution, in order to negotiate with the Minister on Regulations and Orders. The men on this committee should be chosen for their sectional interests and would discuss details of administrative machinery and conditions of service. But the fundamental principles of the Act would by this time have already been settled by the first committee, representing the B.M.A. only and, through it, the profession.

We have now reached a critical stage in our relations with the Government. The Minister has asked for negotiations to be started, presumably in accordance with the terms of our recent resolution. This resolution suggests very feebly that the Minister may agree during some stage of the negotiations to consider an alteration in the Act itself. It would be wrong of the Minister and the negotiating body to assume that this milk-and-watery resolution reflected the true attitude of the Representative Body. This body only gave way on the main resolution as a result of verbal promises made by the Chairman of Council. But the feeling of the meeting could not be mistaken. There was a determination not to compromise on its main principles and only to enter negotiations on the certainty (not the hope) that the Act itself would be amended.—I am, etc.,

Newcastle-upon-Tyne. H. H. GOODMAN.

### An 84-hour Week

SIR,—With your permission I would like to answer Dr. R. Dingwall Kennedy and several personal correspondents. It is becoming obvious that a large number of clinics will not be established for some years. During this period doctors' wives will be confined to their homes seven days and nights a week to answer calls. To-day many doctors are not providing a 24-hour service and are "getting away with it." Under the National Health Service scheme doctors, after an initial fine, will be directed by the Minister to find an outlet for their energies elsewhere than in the scheme. He will have the power, will use the power, and in my humble opinion will be quite right to do so, if we sign the contract.

My letter was written as a warning and contained a constructive suggestion. Half-day and holiday rotas can be worked out by the doctors themselves, but an emergency night service should be provided by the Minister. Among other things this will obviate the need of trying to get a domestic to live in. If we are to have planning let us plan properly, so that general practitioners and their wives may lead fuller and less harassed lives.—I am, etc.,

London, S.W.6. G. ROSEMONT.

### Cerebral Malaria in Great Britain

SIR,—Dr. P. H. Willcox (March 8, p. 310) has wisely stressed the importance of C.S.F. examination in individuals developing fever and meningism on return to this country from endemic malarious regions. On account of the frequency of malarial relapses it is also well to stress that in these cases malaria should first of all be excluded from the clinical picture before undertaking laboratory investigations for suspected concomitant infections, such as meningococcal meningitis. Negative blood films should never preclude the possibility of malaria, for among all its protean forms the cerebral type (except in children) most frequently evades microscopical detection.

A full-blown pyogenic meningitis, on the other hand, can always be bacteriologically confirmed, though investigation to this end frequently necessitates anaesthesia before cerebrospinal fluid can safely be withdrawn from a restless delirious patient.

Intravenous quinine is easily administered, and in cerebral malaria response is rapid and certain except when dangerous hyperpyrexia has supervened—a threat which is surely a further incentive to its prompt administration. Rapid subsidence of symptoms establishes diagnosis, or at least proclaims the dominance of malaria in the clinical picture.

Intravenous quinine is fraught with no particular danger, and where rapid decline of temperature and emergence from delirium or stupor do not ensue, investigation can then be directed to the cerebrospinal fluid without having lost valuable time—for time is a more urgent factor in the treatment of cerebral malaria than in any pyogenic form of meningitis. It should not be forgotten that a leucocyte count at the outset, when examining for parasites, helps in differential diagnosis.

I well recall the case of a young Frenchman brought to hospital in West Africa in 1943. He was febrile; restlessness and delirium had continued for 3 days before admission, and there were present

too all the signs of meningism, including nuchal rigidity and Kernig's sign. Blood films on admission were negative for malarial parasites, but despite this and during preparations for withdrawal of C.S.F. it was suggested that he be given intravenous quinine, 10 gr. (0.65 g.).

Half an hour after administration delirium had ceased, and lying comfortably in bed he spoke quietly and coherently and was curious to know what had happened to him. Examination of the C.S.F. was then carried out and meningitis excluded as a concomitant condition.

Malaria is a great simulator, and while not having had the opportunity of reading Dr. Walter Broadbent's letter (Jan. 4, p. 32) I conclude this fact was uppermost in his mind when approaching his case.—I am, etc.,

London, W.1. A. C. LOVETT-CAMPBELL.

SIR,—In subtertian malaria schizogony takes place in the capillaries and not in the peripheral blood. If the parasites "swarm" in abdominal capillaries, cholera, dysentery, biliary colic, cholecystitis, pancreatitis, liver abscess, or even acute obstruction may be simulated. Similarly if the parasite "swarms" in the capillaries of the lungs, it may simulate bronchitis, pneumonia or pleurisy. It may even invade the capillaries of the heart and give rise to symptoms resembling myocarditis. The cerebral type is due to "swarming" in the capillaries of the brain, which become blocked by emboli of parasites undergoing schizogony.

In the communications published in your correspondence columns on this subject the type of parasite is not mentioned. If *P. falciparum* is absent and only the B.T. parasite is present, I should doubt the diagnosis of cerebral malaria as I understand it and look for some other cause of the cerebral symptoms.—I am, etc.,

Brookwood, Surrey. H. M. STANLEY TURNER.

## Retrodisplaced Gravid Uterus

SIR,—I have read with considerable interest the paper (Feb. 1, p. 169) on retrodisplaced gravid uterus by my old colleague, Mr. H. H. Fouracre Barns, but must quarrel with his conclusion that operative treatment of retrodisplaced uterus on account of abortion is not advocated.

In patient No. 39 Mr. Barns records the occurrence of three pregnancies in a patient in whom a ventrisuspension operation had been carried out. There is no record of the position of the uterus in the first two, but in the third it was certainly retrodisplaced, and following correction of this displacement a successful pregnancy occurred. From this it may reasonably be deduced that the ventrisuspension operation was unsuccessful and that the uterus was retrodisplaced in the first two pregnancies. When retroversion was eliminated the third pregnancy went successfully to term, and it seems probable that the same satisfactory conclusion might have been secured in the first two pregnancies had anteversion of the uterus been ensured.

In his case No. 42 spontaneous anteversion of the uterus following pessary treatment at the twelfth week was unsuccessful in preventing abortion nine weeks later. In the next pregnancy, however, the uterus was replaced at nine weeks and pregnancy proceeded to a successful conclusion. In this case the circulatory or other factors adversely influencing successful nidation in cases of retrodisplacement of the uterus were treated in the second pregnancy at a sufficiently early stage to allow of recovery and restoration to normal, whereas in the first pregnancy treated at twelve weeks circulatory factors had already caused so much disturbance that it was impossible for the pregnancy to continue.

In one of my own cases abortion occurred at 12 weeks in her first two pregnancies. On each occasion the uterus had been retroverted when she was first seen at eight weeks and had been manipulated and maintained in a position of anteversion by pessary, but, in spite of this, abortion had taken place about a month later on each occasion. Following this ventrisuspension was carried out and her third pregnancy went to term uneventfully. In this patient nidation had been so adversely affected by retrodisplacement during the first two months of the pregnancy that it was impossible for the pregnancy to continue. This is in contradistinction to the second pregnancy of Mr. Barns's case No. 42, but an individual variation in the capability of the pregnancy of tolerating adverse circumstances is found in other connexions than retrodisplacement.

While I agree with Mr. Barns's contention that habitual abortion may occur in patients with retrodisplacement of the uterus for reasons unconnected with this fact, I feel nevertheless that where abortion has occurred more than once and where the uterus is found to be retrodisplaced there is a strong indication for ventrisuspension. As he himself has pointed out, circulatory abnormalities may interfere with the imbedding of the ovum. I agree that in the vast majority of cases retrodisplacement in the early months is compatible with normal pregnancy, and I share Mr. Barns's Service experience in this connexion; but nevertheless where abortion has occurred I feel that the factor of retroversion, which can be so easily eliminated, should be removed by operative means.—I am, etc.,

Inverness. J. A. CHALMERS.

## Thrush Vaginitis in Pregnancy

SIR,—Much has been written on the treatment of *Monilia albicans* in pregnancy by various authors, and a majority use a 2% watery solution of gentian violet. From thereon their methods of application and frequency of application, etc., vary very considerably. Several of the drawbacks to this treatment are: (1) the difficulty in adequately swabbing all the folds of the pregnant vagina; (2) the discomfort to the patient; (3) the very undesirable soiling of the patient's vulva, which secondarily soils her underclothing; (4) the difficulty in getting a cure by this intermittent method.

For two years now I have been getting excellent results by the following method:

The 2% solution of gentian violet is kept in a bottle with a neck not larger than 3/8 in. (0.9 cm.) in diameter (internal measurements). A "tampax" tampon is held against the open neck of the bottle, and the tampon and bottle are inverted and held in this position until the gentian violet has diffused almost the full length of the tampon, expanding it slightly. A Brewer's or Cusco's speculum is placed in the vagina and the large cheesy colonies of monilia are wiped away and the tampon inserted into the posterior vault of the vagina. This is left *in situ* for a week, when it is removed and replaced by another fresh and similarly treated tampon. On the average I have secured a cure after three weeks of treatment. The tampon's continuous supply of gentian violet constantly acts on any monilia present. The soiling of the patient (plus the operator and his equipment) is reduced to a minimum, for any discoloured seepage from the vagina is easily controlled by an ordinary sanitary towel worn by the patient.

With this treatment the itching and discomfort of the patient usually disappear within twenty-four hours, and a complete cure is usually obtained in two or three applications. This method lends itself very favourably to treatment in private practice.—I am, etc.,

Derby. LINDSAY WATT.

## Achromotrichia in Tropical Malnutrition

SIR,—During three years of service in the S.E.A.C. and with the occupation force in Japan I have seen a large number of nutritional anaemia cases. I am not including here those in whom anaemia was a feature of sprue syndrome. These patients were young Indian other ranks between the age groups of 20 and 30 years and almost all of them strict vegetarians. The presenting symptoms were breathlessness on exertion, progressive debility, and anorexia. They invariably ran a low-grade intermittent temperature. Diarrhoea was not a common feature until the end and the tongue was not sore. Rarely manifestations of other associated avitaminosis, like dry rough skin and pigmentation over the face, were present. C.N.S. was never involved. Haematocrit investigations done on some mostly revealed that the anaemia was of the hyperchromic megalocytic type.

In confirmation of what Capt. E. Roebuck writes (Aug. 24, 1946, p. 277), I may add that achromotrichia without any alopecia or looseness of the roots was noticed very often. Although I have not any statistical control studies I feel quite certain that the incidence of depigmentation of hair among such patients far exceeds that in the population at large. Another thing noticed was that more North Indians were treated in hospitals for gross degrees of anaemia although probably there are more vegetarians from South India in the Indian Army. They responded very well to high protein diet, iron, and vitamins, with liver administered parenterally. Blood transfusion was needed frequently and a common effect not often recorded was that the irregular temperature settled down immediately after it.—I am, etc.,

British Occupation Commonwealth Force, Kure, Japan. S. K. ROY, Lieut.-Col., I.M.S./I.A.M.C.

# Obituary

## BRYAN AUSTIN McSWINEY, M.B., Sc.D., F.R.S.

British physiology and St. Thomas's Hospital, London, have lost an outstanding personality by the sudden death of Prof. Bryan Austin McSwiney on March 8.

An only child, he was born in Chicago on May 20, 1894; his family came from County Cork, Eire. Entering Trinity College, Dublin, in 1913, he was elected the Reuben Harvey Scholar in 1915. He then became a surgeon sub-lieutenant in the Royal Naval Volunteer Reserve and saw service in the Eastern Mediterranean. Recalled to complete his medical studies, he graduated B.A. in 1916, and M.B., B.Ch., B.A.O. in 1917. He took the Sc.D.(Dublin) in 1928. Commissioned as a lieutenant in the R.A.M.C., he acted as assistant to the scientific adviser of the Ministry of Food. At the end of the war he was appointed assistant to the Professor of the Institutes of Medicine in the School of Physic, Trinity College, Dublin. In 1919 he became lecturer in experimental physiology in the University of Leeds. In the following year he succeeded T. Graham Brown as lecturer in experimental physiology at the University of Manchester, under Prof. A. V. Hill. Here he remained for six years and began his study of involuntary muscle which was to interest him throughout the rest of his academic career. While in Manchester he collaborated with Prof. J. S. B. Stopford and the late Mr. E. D. McCrae in a study of the efferent innervation of the stomach, and with Dr. J. C. Bramwell and Prof. Hill in the measurement of pulse wave velocities.

In 1926 McSwiney was invited to return to Leeds as professor of physiology, a position he was to occupy for the next ten years. During this time he accomplished much of the work that brought him a world-wide reputation. His particular interest lay in the gastro-intestinal tract. Initially concerned with its motility, he became interested, through the problem of its tonus, in the study of the afferent innervation of the gastro-intestinal tract. In their attack on this problem the work of McSwiney and his colleagues bears all the hall-marks of singleness of purpose, consummate skill in physiological experimentation, and painstaking accuracy. McSwiney's interests in physiological investigation were not confined to academic research; he realized to the full the part physiology could, and must, play in industry, and he was always willing to place his knowledge and enthusiasm at the disposal of industry. In his department he gave hospitality to physiologists and chemists working on behalf of the Safety in Mines Research Board, and to others concerned with subjects as diverse as the fastness of dyes in textiles, and veterinary anthelmintics. During this period he showed a flair for organization and for laboratory design. He was chiefly responsible for the design and equipment of a new wing to house physiological and biochemical research. This building, which contains an animal house, operating theatre, *x*-ray laboratory, workshop, and a small-scale chemical plant, in addition to biochemical and experimental physiology laboratories, remains in the forefront of such design.

In 1936 McSwiney was invited to the chair of physiology in the University of London at St. Thomas's Hospital Medical School, in succession to Prof. John Mellanby. In June, 1939, he learned that W. M. Boothby and his colleagues had developed an efficient mask which would deliver oxygen at high concentrations with minimal embarrassment to the subject. With Sir Henry Tidy and Dr. J. Forest Smith he journeyed to Boothby's laboratory at the Mayo Clinic. They returned the week before the war began with much of the basic equipment used to form the oxygen therapy units of the E.M.S.

When it became necessary to evacuate the hospital and medical school from London in October, 1940, McSwiney was largely responsible for their establishment in Surrey. After his appointment as Dean of the medical school in 1940 he continually concerned himself in maintaining and extending the activities of the hospital and the school and later in arranging for their re-establishment in London. He was elected a Fellow of the Royal Society in 1944, and to the Senate of London University in 1946.

Since the war he had twice visited the West Indies on behalf of the University of London to consider the possibility of establishing a medical school there. Last summer, at the request of the Colonial Office, he toured East Africa to report on medical education. He had returned from examining for the Primary Fellowship of the Royal College of Surgeons in Egypt, India, and Australasia only a week before he was taken ill with bronchopneumonia, which was the prelude to his sudden and untimely death.

Bryan Austin McSwiney was remarkable for his accessibility. He listened as attentively to the most junior technician as to the most senior surgeon or physician. He was always willing to discuss any problem, though not prone to give dogmatic advice. His enthusiasm was boundless, his encouragement infectious, and he revelled in work. He believed, more than most, in the apprenticeship system, but once the term had been satisfactorily served he gave his colleagues his complete trust and support. Many owe such knowledge as they possess of a particular subject not so much to what he told them as to the encouragement and opportunities he gave them to further their own investigations. Above all, his views were sound common sense. He will be missed by many people, not all within his immediate academic circle. He leaves a widow, two daughters, and three sons.

Mr. John B. Hunter writes: The news of the death of Bryan McSwiney will have come as a great shock to his many friends and colleagues. He came to London with a great reputation as a physiologist, both as a teacher and research worker, having held several appointments in the provinces. Shortly after his arrival he showed he was also a man of affairs. He was in great part responsible for the promotion of the resuscitation units that were formed during the war, bringing his physiological knowledge of shock to the practical side of resuscitation. In 1940, when he was appointed Dean of St. Thomas's, he became known to a wider circle in the University of London. His gift of clear thinking and his administrative qualities were soon appreciated, and he became secretary to the Conference of Metropolitan Deans and a member of the Collegiate Council of the University, and, later, a member of the Senate. It was my good fortune to be associated with him in these activities, and together we travelled some thousands of miles on a Colonial inquiry, and I came still more to appreciate his likable qualities and his sense of humour, chiefly shown in his appreciation of the ludicrous, which does so much to keep our sense of proportion. His advice in connexion with medical education in the West Indies and Africa will be sorely missed in the University of London and the Colonial Office—for he had wide knowledge of the subject gained at first hand in the Colonies—as will his counsel on medical education in this country.

## R. J. GLADSTONE, M.D., F.R.C.S., F.R.S.Ed.

The anatomical world will mourn the death of R. J. Gladstone on Feb. 12, for, although he did not hold a chair of anatomy, he was one of the best-known members of the Anatomical Society of Great Britain and Ireland for over fifty years. He was born in 1865, the son of Dr. T. H. Gladstone, and was educated at Clapham Grammar School and the University of Aberdeen, where he qualified M.B., C.M. in 1888. After leaving Aberdeen he became house-physician and later house-surgeon at the Middlesex Hospital. Having a bilateral congenital cataract, he decided to make anatomy his special field of work, and was appointed junior demonstrator in anatomy at the Middlesex Hospital Medical School in 1895. The following year he was promoted to senior demonstrator of anatomy and took his final F.R.C.S.

By this time Gladstone had already started to publish some of his original papers, and in 1905 he went to Vienna with Dr. R. A. Young to investigate methods of teaching anatomy and surgery. A year later he visited Vancouver as a representative of the British Medical Association. He made new contacts and friends and came back to this country with fresh ideas on the teaching of medical students. He continued his association with the Middlesex Hospital until early in 1913, when he became reader in anatomy at King's College, London, a post he held until his retirement in 1938. Gladstone had a very extensive knowledge of anatomy, morphology, anthropology, and embryology. He read extensively and was a thorough master of his subject. Sir Arthur Keith was wont

to say that Gladstone had a better knowledge of human and comparative embryology than any other anatomist of his day.

Gladstone was a born worker and put in a very full day in the anatomy department. He did his full share of demonstrating in the dissecting-room, and in this respect was an example to those senior demonstrators who consider their job is purely research. At night he worked on the many papers that came from his pen. He loved music and was always delighted to attend any musical show that medical students organized. He was an ardent supporter of the Zoological Society and spent most of his Sundays in the gardens making friends with a variety of different animals.

He could not see clearly beyond a few feet, and this no doubt was his greatest handicap in life, as he could not see the pranks his students were performing during his lectures, and he would have found it difficult to have had sole charge of a department. Although the students ragged him and were liable to be somewhat uproarious during his lectures, he was very popular and was affectionately known as "Gladeye." He worked hard for the Anatomical Society and put in many years as Recorder; his notes of meetings were a model for any successor to emulate. He rarely missed a meeting and was always willing to help the younger members of the Society. He never pushed himself forward and was always content to take a back seat. When he spoke at meetings his remarks were constructive and had practical experience as their main background.

Gladstone wrote with Cecil Wakeley a book on the pineal organ, which is a most comprehensive volume and one which has been styled as the most practical and valuable work that has ever been published on that subject. In 1930 he began to write a textbook on human embryology, but this has never been completed. This was because as soon as he finished one section he wanted to revise it and bring it up to date. He completed over 500 drawings for this book, and anatomists the world over are the poorer for its non-appearance. He married in 1912, and a son and a daughter completed a very happy home. He often worked far into the night, and was meticulous regarding the facts and figures that appeared in his writings. For many years he was a valued contributor to the columns of the *British Medical Journal*, and he had been a member of the B.M.A. for over fifty years.

He was a lovable and meek man who turned the other cheek rather than speak out against those who did not agree with him. When he retired from King's College he spent his time abstracting medical literature, or else reading proofs and verifying references in medical articles passed for press. His house in Dulwich was bombed in 1941 and he had to move. He found a new home at Brockenhurst, where he continued his work until a few days before his death. Gladstone was a born artist and illustrated his many papers with excellent drawings. His daughter has inherited this talent. Gladstone left a wealth of embryonic material behind him at King's College. There are series of sections of human embryos, all carefully documented, which should prove of the greatest value to students of anatomy and embryology.

### LOUIS COBBETT, M.D., F.R.C.S.

Dr. Louis Cobbett was taken ill at his home at Cambridge on March 9, and died in hospital the next day at the age of 85. Louis Cobbett was born in 1862 and was educated at Lancing and Trinity College, Cambridge. After leaving Cambridge, where he had come under the influence of Sir George Humphrey, he went to St. Thomas's Hospital, obtaining the Conjoint Diploma in 1890, the Cambridge M.B. in 1892, and later the F.R.C.S. He was house-surgeon to the late Sir William MacCormac. He proceeded M.D. in 1899 with a thesis "On the nature of the action of antitoxin."

He returned to Cambridge in 1893 as demonstrator of pathology under C. S. Roy, the first professor of pathology in the university. In 1894 he resigned the demonstratorship and became John Lucas Walker student, a post he held till 1897. In 1894 he became interested in diphtheria, especially in the production and effects of antitoxin and in the cultural characteristics of the diphtheria bacillus. During the next few years he published several papers on these subjects. In 1900-1 outbreaks of diphtheria in Cambridge and Colchester gave him the opportunity of tracing the spread of the disease by the examination of school and other "contacts." He investigated the virulence of cultures from all patients and infected contacts, and in order to check the spread of the disease arranged for the isolation of the latter till the bacilli had disappeared from their throats and noses. His were among the first large-scale investigations of this type.

In 1902 he was appointed scientific investigator to the Royal Commission on Tuberculosis, with charge of one of the experimental farms at Stansted. The well-known results of his work there were published in an appendix to the Royal Commission's report of 1907. For about a year he held the professorship of pathology in the University of Sheffield and then returned to Cambridge in 1908 on his appointment to the lectureship in pathology, a post he held till 1929. During this period he taught with great enthusiasm and published many papers, chiefly on the mode of spread of tuberculosis. After retiring from the lectureship he worked in the department of pathology, mainly on the bacteriology of tuberculosis, and gave courses of lectures to students taking Part II of the Natural Sciences Tripos. He had been a member of the British Medical Association and acted as vice-president of the section of pathology and bacteriology at the Annual Meeting in 1920.

According to a correspondent Dr. Cobbett was remarkable for his kindly disposition, his keenness in teaching, his interest in and kindness to the junior assistants in the department, and his enthusiasm in discussing every subject in which he was interested. He was unmarried.

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Dr. PRIDEAUX GEORGE SELBY died at the age of 81 on Feb. 26. Dr. Selby was born in 1865 at Dunedin, New Zealand. He was educated at Bedford Grammar School and at St. Bartholomew's Hospital. After qualifying in 1887 he studied for a while in Vienna. In 1890 he started in general practice at Teynham, Kent, and was soon after appointed medical officer of Beaconhill Hospital in the old Faversham Rural District Council. In 1905 he succeeded the late Dr. F. A. Genge as medical officer of health for that district. In 1935, when the Faversham and Milton rural districts were amalgamated to form the present Swale Rural District, Dr. Selby retired, but on the death of his successor, Dr. Wernett, he resumed duty as acting medical officer of health pending a new appointment. When war broke out it became impossible to make such an appointment and Dr. Selby had loyally carried on ever since. A great deal of work devolved on him in organizing and superintending A.R.P. work in this locality, and many bomb incidents had to be attended to in addition to his ordinary work. He sold his general practice in 1943, but continued his work as acting M.O.H. until his death. During the war of 1914–18, Dr. Selby served with the rank of major in the R.A.M.C., and was awarded the O.B.E. Dr. Selby contributed two short articles to this *Journal* at the end of the last century and in January last we published a letter from him on the discovery of chloroform. He had been a member of the B.M.A. for just under sixty years.

# Medico-Legal

## A CONFLICT OF EVIDENCE

### The Cornock Case

The trial of Mrs. Rosina Ann Cornock, who on March 7 was acquitted at Bristol Assizes, furnished an unusually striking and complete conflict of medical evidence.

Mr. Cornock was addicted to masochistic practices in which his wife took part, and on the evening of Friday, Dec. 6, 1946, the day before his death, she had at his request tied up his wrists and ankles and beaten him. A young cripple called Gilbert Kenneth Bedford, and said to be in love with her, was staying in the house with the couple for the week-end (as he often had before). He saw the scene through a glass-panelled door. At some time after 1 a.m. on Sunday, Dec. 8, Mrs. Cornock called an ambulance, and at 2 a.m. Dr. G. R. Fells found Mr. Cornock's dead body laid in a bedroom. The head was bruised in five places, the shoulders and elbows were injured, the small of the back was abraded, the knees and shins were bruised, and the wrists and ankles were rope-marked. Torn-up love-letters written by Mrs. Cornock and Bedford to

each other were found. Mrs. Cornock was on Feb. 7 last two months pregnant.

The Crown suggested that she had again tied Mr. Cornock up at his request, and taking advantage of his helplessness, drowned him in the bath. Her own story was that she did not love Bedford and her child was her husband's, by an act of intercourse about a fortnight before his death. On the Saturday evening, when Bedford was out, the husband had insisted on another act of perversion (not specified, but described by the prosecution as "disgusting and incredible"), and afterwards she had prepared a hot bath for him. He had gone up to take it between 10.30 and 11 p.m. Bedford had come in just then. After what seemed a long time she had gone upstairs and found her husband lying in the bath with one leg on either side of the top edge and his head under water. She had felt his pulse, which had stopped, and had pulled out the plug. She and Bedford had dragged him out, dropping him back once, and again on to the floor, and a part of the geyser had broken off and wounded his shins. In the bedroom she had performed artificial respiration on the body for three-quarters of an hour. Realizing that this was hopeless, she had summoned help.

The medical evidence, therefore, became highly important. Dr. A. D. Fraser, honorary pathologist at Bristol Royal Infirmary, gave the cause of death as asphyxia by drowning. On a wax model head he demonstrated the five separate severe blows, which he said could have been caused by a toy boat about a foot long, produced. He said the injuries to the shoulders, elbows, and knees were caused before death, possibly by the sides of the bath during a struggle. The abrasions on the small of the back could have been brush burns made by friction of a rope. He would not expect a man to faint in a bath from exhaustion due to the perverted practices described.

On the other side Dr. C. R. Gibson, surgeon to the Bath City Police, said that the scalp injuries were consistent with heavy bumps on a flat surface when the heart's action was feeble. The injuries on the shoulders and elbows could not have been caused either by rubbing or by hitting the sides of a bath full of water, but might have been caused by the body being dragged or dropped. The marks on the knees could not have been made by the knees being rubbed together, but could have been caused in a small bathroom by the body falling on the ground from the edge of the bath and then being rolled over on to the face for artificial respiration, He had verified by experiment on himself that rope-marks on his wrists made an hour before a bath would show as bruises afterwards. To the prosecuting counsel (Mr. G. D. Roberts, K.C.) he answered that the explanation of a struggle for life in the bath would be a very easy but a very bad one. Dr. A. L. Taylor, honorary pathologist at Bristol General Hospital, said that the toy boat was an extremely unlikely instrument to have caused the head injuries, and the back injuries could have been caused by the dumping of the body on the floor.

The medical witnesses were agreed, therefore, that the injuries were caused during life. They disagreed almost entirely on the means by which they could possibly have been inflicted. This disagreement must have contributed greatly to the reasonable doubt which led the jury to acquit the prisoner.

# Universities and Colleges

## UNIVERSITY OF OXFORD

In a Congregation held on March 1 the following medical degrees were conferred:

D.M.—W. E. Gibb.
B.M.—Elizabeth M. C. Dyke.

## UNIVERSITY OF CAMBRIDGE

The following candidates have been approved at the examination indicated:

M.CHIR.—R. L. Canney, A. S. Till, W. W. Wiggins-Davies.

Thomas Renton Elliott, M.D., F.R.S., Emeritus Professor of Medicine in the University of London, has been elected into an Honorary Fellowship of Trinity College.

The Linacre Lecture on "Man's Place Among the Primates" will be delivered by Prof. F. Wood Jones, F.R.S., in the anatomy school of the University on Tuesday, May 6, at 5 p.m.

# Medical Notes in Parliament

## SCOTTISH HEALTH SERVICE BILL

The Standing Committee on Scottish Bills considered on March 11 Clause 35 of the National Health Service (Scotland) Bill. This Clause deals with compensation for loss of the right to sell a medical practice.

Cmdr. GALBRAITH proposed that compensation should be paid forthwith or as soon as practicable after the appointed day or the day on which the medical practitioner to whom it was payable was entered on a list of practitioners undertaking to provide general medical services. It was wrong that a person should not be compensated immediately for a realizable asset. Why should doctors be forbidden to receive compensation until they died or retired or until they fell into line with some circumstances which the Secretary of State would lay down in his regulations? The doctor might have borrowed money to buy the goodwill of his practice and might wish to repay the loan, but he was not allowed to do so. So far as Cmdr. Galbraith could understand the Clause the interest on the doctors' compensation would accumulate. He did not see why this interest should be withheld. A doctor who had purchased the goodwill of a practice and had practised for two or three years might want to specialize, and might require something in his pocket to enable him to do this. Under the Clause that opportunity was taken away from him and from the doctor who wished to secure the payment for the purpose of educating his children or in order to accept a post in one of the big infirmaries.

### Arrangements for Compensation

Mr. BUCHANAN secured the approval of the Chairman for an enlargement of the discussion to cover a subsequent amendment to permit payment of the compensation when the practitioner reached the age of 65. Mr. Buchanan said he could give a general outline of the proposed regulations. The English Act dealt with this exact question in regard to England. The British Medical Association was a body which dealt with the whole of Britain and negotiated for Britain as a whole. If an alteration were made in the terms of the Scottish Bill the Government would need to pass an amending Bill altering the English Act. If doctors, particularly young doctors, had bought their practices and incurred substantial debts the Government proposed to pay. The Bill covered the case of a doctor who sold his practice and decided to take a hospital appointment. If a doctor took a local authority appointment or became a works doctor, the Government would also pay him. The only case in which it would not pay was that in which a doctor remained in practice. There was no hardship there. Where a doctor proposed to buy another practice he almost certainly would pay as much for the new practice as he would for the one he was quitting. So there was no hardship. In the case of retirement the Government proposed to pay, and the position of a doctor going overseas to practise would be the same. The only persons who would not get compensation would be the doctors who remained in practice. The Government had gone out of its way to meet all possible contingencies.

Col. ELLIOT could not agree that a doctor moving from one practice to another would normally be exchanging like for like. A doctor in a large industrial practice looked forward to taking at a later stage of life a smaller practice in the country. That was a very old custom, and Dr. Johnson had referred to it. Did Mr. Buchanan say that in such a case the doctor must surrender the unexhausted goodwill of the medical practice in the industrial area and be compensated when he finally retired on the basis of a small practice in a remote part of the country? He asked whether Mr. Bevan was in negotiation with the medical profession on these points. The sale of practices was a matter to which the profession attached great importance and on which they looked forward to considerable concessions from the Minister. As Mr. Buchanan had said, the English Act and this Bill were closely linked, and in any negotiations doctors in Scotland ought not to come off worse than doctors in England.

Mr. BUCHANAN said Scottish doctors would be treated equally with English doctors. The Government would bear in mind the issue of semi-retirement. That was the only issue it had in mind.

Mr. SOMERVILLE HASTINGS hoped Mr. Buchanan would look at this matter again. No doctor should enter the new Service with a sense of grievance. Many doctors had approached Mr. Hastings on this matter of retirement and would in many cases rather have some ready money at once. Many doctors wished to take an easier job, or to buy a smaller house, and to have a sense of security, knowing that they had this little

house when they retired. Means should be found to enable doctors to claim their retirement money before the day on which they left the Service.

Mr. BUCHANAN said he wished that Mr. Somerville Hastings could have done all this in connexion with the English Bill.

Mr. HASTINGS said he did try.

Major LLOYD said every medical man knew there was a grave risk in the present state of the country that the value of the pound would fall materially before deferred compensation was paid. In view of Mr. Buchanan's statement Cmdr. Galbraith withdrew his amendment and Clause 35 was ordered to stand part of the Bill. Clause 36 was also ordered to stand part, as was Clause 37 on which a drafting amendment was made.

### Pharmaceutical Services

On Clause 38 Mr. REID raised the question of the transport of drugs and medicines from the manufacturers to the chemists' shops. He pointed out that ordinary transport organizations might not be able to undertake this work efficiently. Mr. BUCHANAN said that his Department was in consultation with the Ministry of Transport. The interests of the chemists would be safeguarded.

On Clause 39 Mr. MCKIE suggested that subsection 1 would prevent the medical or dental practitioner from providing pharmaceutical services to any person to whom he rendered general services.

Mr. BUCHANAN said that in almost nine-tenths of the cases in Scotland the chemist rather than the doctor did the dispensing. Even in rural districts the chemists did most of the job except in the Highlands and Islands. In rural areas where the circumstances were similar to those in the Highlands and Islands the Department proposed to make regulations whereby the doctor would be able to dispense as well as the chemist. Medical skill should be utilized in the main for more important branches of work while the chemist carried out the dispensing. Col. ELLIOT said that, although an orthodox practitioner, as a citizen he admitted that those who did not believe in orthodox medicine had the right to be provided for. These persons wanted to be sure that the Clause would not preclude the making, for example, of a herbalist prescription. He wanted to be assured that the homoeopathic system of medicine, in which he did not himself believe, would still be possible.

Mr. BUCHANAN said the answer was yes, provided everything was prescribed and dispensed by people with proper qualifications.

Dr. MORGAN said there was no such thing as a herbalist's prescription.

### Disqualification of Doctors

Clause 39 was ordered to stand part, and Clause 40, on supplementary ophthalmic services, was accepted without discussion. On Clause 41 Cmdr. GALBRAITH moved to leave out the words "prejudicial to the services in question" in the subsection providing a tribunal for inquiry into the conduct of practitioners. He proposed to substitute "detrimental to the interests of his patients." He said the words proposed to be left out were very wide. If a practitioner was remiss in sending in his returns, or sent them in wrongly made out, this would be prejudicial to the services but not to the interests of his patient. It might be that he was treating his patient so well that he had not time to devote himself to compilation of the returns.

Mr. BUCHANAN said he had been attracted by the amendment but it was not easy of acceptance. A doctor might be asked to render a service to another doctor in emergency, but might flatly refuse to help. That would not be detrimental to his own patients, but would be against the well-being of the Service as a whole. On the other hand Mr. Buchanan did not want to have doctors "kicked around" because they drove a motor-car too fast or had a quarrel with a policeman. A good deal of the wording of the section was from the National Health Insurance legislation, about which there had been no complaint. He would look into the matter again before the Report Stage but could not agree to insert the words "his patients."

Mr. REID suggested the words "interests of those requiring his professional services." He remarked that it had been much easier for a doctor who had been turned out from the National Health Insurance scheme to make an alternative livelihood than it would be in the future. A kind of medical law was being started, and in law it was essential to have a specification of crimes and offences as well as a judge who would understand the position.

Mr. BUCHANAN agreed that any man charged must know specifically with what he was charged.

Sir JOHN GRAHAM KERR thought there was great danger in the proposal of the Bill that representations against a doctor could be made by "any other person." Such representations might be actuated by jealousy or other personal feeling.

Mr. BUCHANAN said he would look at that issue. The Committee must remember that the Scottish Health Service would be linked inevitably with England. Dismissal in one country carried with it dismissal in the other and it would be indefensible that conditions should differ in the two countries.

Dr. MORGAN said doctors had been penalized unnecessarily for offences which were social and personal and not professional. The British Medical Association now had a committee discussing the whole question of these offences in relation to the General Medical Council. Income-tax inspectors had threatened to bring doctors before an insurance committee for not paying their taxes promptly.

The amendment was withdrawn and Mr. REID moved another amendment to challenge the provision that a man could be taken off the list for a particular area but left on the list for another district. If his activities were injurious to district A, why were they not injurious to area B? There ought to be something short of removing a man completely from all lists. He suggested some fine or suspension for a short period.

### Shape of Things to Come

Mr. BUCHANAN could not accept the amendment. In his local government experience he had known that it was a good practice to transfer a policeman from one district to another but not to sack him. That might apply to doctors. Doctors could get into bad company just as Members of Parliament could. He was not keen on fines if these could be avoided. To fine a doctor £50 or £100 might be disastrous to him. A change from one district to another was the best way. He had known a case where it was good for a sheriff when he was shifted back to a big city and was given harder work to do.

Col. ELLIOT asked the Committee to note the length to which regimentation was inevitably carried under the Bill. The mind of Mr. Buchanan was running on the analogies of whole-time service by the sheriff and the policeman in connexion with power to transfer from one place to another. To Mr. Buchanan he said, "Do not interfere unless the offence is so grave that it would prejudice the chances of the patient being successfully treated." To say "this man is unpopular here but he would do well somewhere else" meant involvement in local squabbles and might stultify the practice of medicine.

Dr. MORGAN said the General Medical Council had now adopted a process by which a man was found guilty but was not struck off. He was asked to come before them again in six months or a year with testimonials from consultants in the area.

The amendment was withdrawn and Mr. REID moved to delete the subsection dealing with appeals and to substitute a provision that any person aggrieved by a direction of the tribunal might appeal to the Court of Session, whereas the subsection proposed an appeal to the Secretary of State. In recounting the previous stages before an appeal Mr. Reid said he understood that if the tribunal acquitted the doctor the Secretary of State would then appeal to himself.

Mr. BUCHANAN said that if the tribunal acquitted a doctor the Secretary of State had no power whatever. Mr. REID said that in that case Mr. Buchanan had thrown over Mr. Bevan and the whole of the argument by which the English Minister sought to justify this Clause. Mr. Bevan had said, "I must have the last word in every case. I must have it in my own hands to sack a doctor I cannot trust, and I will not delegate that to any tribunal or court." To his credit Mr. Buchanan had recognized that that was an impossible position. If Mr. Buchanan said that he was content to accept the judgment of the tribunal that the man was all right why could he not be content to accept the decision of the Court of Session?

Mr. BUCHANAN said he did not know that Mr. Bevan had made a speech on this subject. He was not bound by somebody else's speeches. He had consulted the Lord Advocate and there seemed no doubt that there was no appeal by the Secretary of State against acquittal. An aggrieved doctor had an appeal to the tribunal, legal members of which were appointed by the Lord President of the Court of Session. The chairman would be appointed by someone connected with the legal profession. The Eighth Schedule of the Bill said the chairman was to be appointed by the Secretary of State, but the Government had an amendment down making it clear that the President of the Court of Session would do it. The tribunal would examine not questions of law but questions of fact. In his view the decision would be final and binding. If, on the other hand, an aggrieved doctor appealed to the Secretary of State he would have a further right of appeal to have his case taken up on the floor of the House of Commons. This could be done by some unorthodox doctor who was raising wide issues. At present doctors in Britain in private practice could be dismissed from National Health Insurance without any tribunal, but in fact this had rarely happened, and the numbe

of cases which the Secretary of State would have to decide would be so small that he would have to examine them with the greatest care. The amendment was rejected by 21 to 14 and the Committee adjourned.

### Reasons for Disqualification

On March 12 Mr. MCKIE said Clause 41 offered many sources of danger to the medical profession. It placed too much power in the hands of the Secretary of State for Scotland and in the tribunal of three persons which it proposed to set up under the direction of the Secretary of State. The powers given to the tribunal were excessive and the Clause as at present drafted opened the door to "snooping" and to possible denunciation of a person who was innocent, particularly in the rural area where there was always much gossip.

Mr. GALLACHER supported the Clause because under it doctors and dentists who felt a grievance could go to their Members of Parliament and get them to make a fight on their behalf.

Mr. REID said the doctrine of an appeal through the House of Commons depended entirely upon bringing political considerations to bear. It was thoroughly wrong. Let the Committee avoid mixing up politics and a judiciary. The Clause did not confer the right of cross-examination of hostile witnesses. He also asked whether reasons would be given when the decision of the tribunal was published. A judge always gave reasons, and those who sat as judges should also do so.

Mr. BUCHANAN said the right of cross-examination would be strictly safeguarded. As to publication, he would look into that. It might be that the published reasons for a dismissal of a doctor might damage him even in his chances of getting any work abroad. Mr. Buchanan thought that the doctor himself must receive the reasons. So must his legal representative. The case to be settled on an appeal was not a legal question but a question of fact. Such cases should not go to the Court of Session. He pointed out that more than 95% of the practising doctors in Scotland were concerned in National Health Insurance and in the past thirty-five years only about a dozen cases concerning them passed through. Yet there were none of the safeguards for them which the Bill provided. When occasionally a man's dismissal had been raised in the House of Commons the subject was above ordinary political difference.

Cmdr. HUTCHISON asked whether under the Crown Proceedings Bill which had been introduced in the House of Commons it would be possible for a doctor dismissed from the public service to sue for wrongful dismissal.

Mr. BUCHANAN said he was told by the Lord Advocate that the answer was Yes. Clause 41 was then ordered to stand part of the Bill.

### Powers of Secretary of State

On Clause 42 Mr. REID moved to leave out the provision that the Secretary of State may dispense with any of the requirements of regulations made under this part of the Act so far as appears to him to be necessary to meet exceptional circumstances. Mr. Reid said this was a wide and dangerous form of power.

Mr. WESTWOOD said this was not a new power and would only be used in exceptional circumstances. It had been in operation under the National Health Insurance Acts since their inception.

Sir WILLIAM DARLING asked if the Secretary of State could give an example of an exceptional circumstance which he had in mind.

Mr. WESTWOOD: "I say quite frankly I cannot."

Col. ELLIOT said these general powers had been in the possession of the Executive for a long time and should continue there. The fact that no Secretary of State had used these powers indicated that on the whole the medical system of treatment had worked out fairly well. What the Opposition felt uneasy about was the narrow point of the permission for the Secretary of State to dispense with the requirements of regulations. A modification of a regulation ought to be brought before Parliament. These powers, which were intended for bringing the new Service into smooth action, should have a time limit placed upon them.

Mr. WESTWOOD promised to look into these points and Mr. Reid's amendment was withdrawn. After further discussion Clause 42 was added to the Bill.

### Charges and Disputes

Mr. MCPHERSON moved an amendment to Clause 43 to make the regulations under this Clause mandatory. The Clause concerned the recovery of charges in respect of certain appliances and dental treatment.

Mr. WESTWOOD said the Government proposed to have the highest standards in health and sight and in all the things that made life worth living. The amendment was withdrawn. A similar amendment dealing with expensive forms of dental treatment was also withdrawn. The Clause was ordered to stand part of the Bill.

On Clause 45 Mr. REID moved an amendment proposing that the Secretary of State, before deciding a dispute between an executive council and a person receiving or claiming services under the Act, should afford both parties an opportunity of appealing before someone appointed for the purpose by the Secretary of State. Mr. Reid said this Clause dealt with all manner of complaints which members of the public might make about services from doctors, dentists, or opticians. If someone of experience in these matters was not to hear the complainants, they would write to their Members of Parliament and the Members would have to do the investigating.

Mr. WESTWOOD gave an assurance that where a complaint was substantial and a person desired a hearing arrangements would be made for that hearing to take place. The amendment was withdrawn and Clause 45 was ordered to stand part of the Bill, as was Clause 46.

### Mental Defectives

On Clause 47 Col. ELLIOT pointed out that under subsection 5 certain institutions were not to be brought in under the Bill. These were institutions established under subsection 1 of Section 28 of the Mental Deficiency and Lunacy (Scotland) Act, 1913, for defectives of dangerous or violent propensities. He asked Mr. Westwood to name these institutions.

Mr. WESTWOOD said the only existing institution of the kind was at Perth prison. That was the only exemption he had in mind at the moment.

Sir BASIL NEVEN-SPENCE referred to the provision in the Clause dealing with the duty of the Secretary of State to co-ordinate and supervise the administration of education authorities and local health authorities with regard to defectives. He said high-grade mental defectives were provided for in special classes and special schools, but the case of the lower grade defectives was not so happy. They were passed on to the public assistance authorities. Prof. D. K. Henderson, who was well informed on these problems, said the question was primarily a health one and that the health authorities should be responsible for looking after these children. Sir Basil was sorry that there was no reference at all in the Bill to ascertainment. That should be dealt with under Clause 47, which mentioned the Mental Deficiency and Lunacy Act. The duty of ascertainment of mental deficiency in children between the ages of 5 and 16 had been placed on the education authorities under the 1939 Act, but these authorities had not carried out their duties. Another defect in the Clause was that it did not bring in the mental defectives under 5 years of age. The only action open to a local authority was to have such a child certified as a lunatic and sent to a mental hospital.

Mr. WESTWOOD said the Clause did not go as wide as he would like it to do. The Bill did not seek to implement the recommendations made by the Russell Committee. The Government was going into that matter and a separate piece of legislation was required. Clause 47 was then ordered to stand part of the Bill. On Clause 48 Col. ELLIOT moved an amendment in order to secure information in regard to the discharge of patients.

Mr. BUCHANAN said at present there was a difference between the person who could pay for treatment and the person who became a pauper lunatic. The private patient could get out of an asylum or out of a place of detainment at the request of his own relatives provided that the superintendent of the institution certified that this discharge created no danger to the public. If that was good enough for the private patient, then the person who was receiving poor law relief should have the same rights. If the superintendent thought that either of these was a danger in any way to the community he had the right to retain the patient. The second point was that a pauper could be retained on one doctor's certificate while a private patient must have two certificates. The Bill made two certificates requisite for both classes of patient. The Government was also making it the law that a local authority should be reasonably satisfied there was a proper place in which both classes of persons could be looked after.

Mr. REID said his friends were delighted to hear of the change in regard to certification, but he was not so happy about discharge. Mr. Buchanan had said the last word was with the superintendent. Mr. Reid had occasion to think that superintendents, no doubt owing to war circumstances, were letting out too easily persons who had been convicted or had been found to be insane and had been put into asylums at the instance of the procurator-fiscal.

Mr. BUCHANAN said the Government was not interfering with the present law but asked that the treatment of persons under poor law relief should not differ from that of others.

Sir BASIL NEVEN-SPENCE said there were people who recovered and were released yet were a menace to the community. It was not the job of the medical superintendent to keep these people in an asylum if they recovered. Col. ELLIOT withdrew the amendment.

Sir BASIL NEVEN-SPENCE said that at present there were fifteen poorhouses in Scotland in which 1,300 pauper lunatics were kept. This perpetuated an association of mental health with the poor law which should have been broken long ago, and he was glad that subsection (b) of the Clause made it unlawful to retain lunatics in poorhouses. The Clause was ordered to stand part of the Bill, as was Clause 49.

### Payments to Regional Boards

On March 15 Clause 50 was ordered to stand part of the Bill with a drafting amendment. The Committee also approved Clause 51, after accepting an amendment moved by Mr. Buchanan.

On Clause 52 Mr. REID asked for an assurance about the method of financing boards of management. He said the Clause provided that all money must be paid in the first instance to regional hospital boards.

Cmdr. HUTCHISON pointed out that money could be provided for the expenses of a tribunal constituted under Clause 41. He asked whether that would cover expenses for a person who appeared before a tribunal.

Mr. BUCHANAN said he would answer that on the Report stage. On the point raised by Mr. Reid, the Government proposed that the management committee would make up a budget each year. It would pass that budget to the regional board which would make a gross budget, covering all the management committees and its own work, and would submit that to the Treasury.

Sir JOHN GRAHAM KERR asked whether there would be means of meeting exceptional hospital expenditure such as occurred when a member of the staff introduced a new method of treating an ailment, a method involving considerable expenditure on premises or appliances.

Mr. BUCHANAN said in such a case there would be no difficulty in having a supplementary grant for that particular purpose. The Clause was ordered to stand part of the Bill as were Clauses 53, 54, 55, and 56, with a minor amendment on Clause 54.

Mr. REID asked why the capital or income of any trust must under Clause 57 be paid to the regional hospital board for the area.

Mr. BUCHANAN said the trustees would decide this matter themselves. They could either pay the money to the board of management or to the regional board. They might take the view that the money should be paid to the particular hospital or that it concerned not one hospital but a group of hospitals.

### Denominational Hospitals

On Clause 58 Mr. REID hoped that other hospitals with a special character would be entitled to preserve that character. He had in mind the homoeopathic hospital or one staffed and run entirely by women for women.

Mr. BUCHANAN, referring to the denominational hospitals, said he agreed with Mr. Reid that there were other similar cases. There were the temperance people who ran a hospital. The Government would try to preserve the character of such hospitals and to get people competent to carry them on, but he could not put in a clause to cover every kind of hospital. He refused to try to give a definition of "denomination." If any group of people who formed themselves into a religious body had a hospital, then the Government would recognize it. The Clause was ordered to stand part of the Bill as were Clauses 59 to 62.

Mr. REID said Clause 63 took power to make regulations on the remuneration and conditions of service of all Government employees. It also made regulations of the same character for all local authority servants employed by an authority as the health authority whether their job had anything to do with the Bill or not. He moved an amendment to make it possible for the Government to make regulations only about the conditions of service of people who performed the functions set up by the Bill.

Mr. BUCHANAN said a dentist might be mainly but not entirely employed by the Government. The agreement with him was a national agreement. The Government wished to ensure that for the small proportion of time he worked for another authority he should not work for a different rate of wages. However, he would look into the matter again.

### "Closed Shop"

Mr. REID withdrew his amendment and moved to insert a proviso that it should not be made a condition of service for any officer that he should or should not belong to a trade union. He recalled that Mr. Bevan last autumn had done all he could to dissuade local authorities in places near London from attempting to enforce membership of trade unions on nurses and others. He said it would assist recruitment of nurses if Mr. Buchanan would put into the Bill words to ensure that none of his successors would be entitled to amend the regulations by putting in a "closed shop" condition of this kind.

Dr. MORGAN submitted that the proviso should not be put in an Act of Parliament. It should be left to the discretion of the local authority. The recent fight at Willesden was between two organizations—one a trade union and the other an association. Mr. Reid's amendment would give local authorities power not only to say that a person should join or should not join a trade union but that they should or should not be a member of an association.

Mr. MACPHERSON said it was customary for members of certain professions to belong to associations. The Bill provided that qualifications could be laid down by the Secretary of State, but that was a different matter from membership of an association.

Mr. BUCHANAN said this was a health Bill and to insert into it an amendment of this kind would do great disservice to the health services of Scotland. The great voluntary hospitals of Scotland could never have carried on if they had not had the financial assistance and enthusiasm engendered by the trade union movement. To single out this movement by an offensive amendment like this would be entirely wrong. The Scottish Health Department had recently communicated a circular to Scottish local authorities. This informed them that while the Secretary of State was anxious that doctors, nurses, and members of similar professions should join a trade union or appropriate professional association he considered that the matter should not be determined by the unilateral action of local authorities.

The amendment was defeated by 25 to 11 and the Clause was ordered to stand part of the Bill.

On Clause 64 Mr. BUCHANAN said the Government proposed to take over everybody who had a superannuation claim and to pay that claim but not to give more. If a man had a reasonable expectation of getting a pension the Government proposed to pay that pension, but it would not add anything. Replying to Dr. Morgan, Mr. Buchanan said he thought that officers due to retire on a pension at the age of 55 would be allowed to continue in service until the age of retirement under the new Insurance Act. Clause 64 was ordered to stand part of the Bill and the Committee adjourned.

### Extra Rations for the Sick

Col. STODDART-SCOTT on March 10 raised the refusal of the Ministry of Food to grant extra rations to sick people when their doctors recommended that they should have them. During the last six months 235 such cases had been refused extra rations. He suggested the establishment of regional medical advisory committees appointed by the Minister of Food. He further suggested that extra food should be given not only for treatment or cure of disease but also to relieve suffering in cases of operation or in inoperable cases.

Mr. SOMERVILLE HASTINGS said the public and the medical profession were satisfied with the arrangements in existence. These seemed to him to be working admirably. The position of the doctor in private practice was not easy and was much strengthened if in refusing a patient's request he could say that the case did not come within the confidential list of diseases for which extra nourishment could be authorized.

Dr. SUMMERSKILL said it was not true that the incidence of disease had been greater during recent years while the country was rationed. The Ministry had to maintain a balance between the physiological needs of the community as a whole and the medical necessities of those suffering from some pathological condition. It had to provide for the children under 5, for nursing and expectant mothers, and for young people up to 18. In regard to hospitals and in the case of invalids treated by a private doctor, the Ministry had to distinguish between medical comforts and medical foods needed for therapeutic reasons. The Food Rationing Special Diets Advisory Committee included men who were authorities in their particular fields and had a wealth of clinical experience. This committee did not pass judgment on treatment. It was in fact an appeal board, and had performed its functions well. It was true that the Ministry relied on one or two members of the committee, but these men were highly qualified and it would be difficult to refer each case to every member of the committee. The proposal for regional committees would involve the setting up of seventeen more committees of busy men, and she opposed the suggestion at the moment. The Ministry was considering the matter carefully, however.

No. 9

## INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended March 1.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland. *Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for:* (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

| Disease | 1947 (a) | (b) | (c) | (d) | (e) | 1946 (Corresponding Week) (a) | (b) | (c) | (d) | (e) |
|---|---|---|---|---|---|---|---|---|---|---|
| Cerebrospinal fever | 74 | 9 | 29 | 2 | 1 | 70 | 12 | 28 | 1 | 3 |
| Deaths | | 2 | — | | | | 2 | 1 | | |
| Diphtheria | 186 | 15 | 46 | 16 | 6 | 501 | 34 | 116 | 71 | 11 |
| Deaths | 5 | 1 | 2 | | — | 9 | — | — | 1 | — |
| Dysentery | 92 | 16 | 16 | — | — | 323 | 24 | 75 | 6 | — |
| Deaths | | | | | — | | | | — | — |
| Encephalitis lethargica, acute | 2 | — | — | — | — | 3 | — | — | — | — |
| Deaths | | — | | | | | 1 | | | |
| Erysipelas | | | 44 | 13 | 1 | | | 44 | 13 | 3 |
| Deaths | | 1 | | | | | — | | | |
| Infective enteritis or diarrhoea under 2 years | | | | 41 | | | | | 51 | |
| Deaths | 83 | 12 | 16 | 11 | 2 | 57 | 10 | 10 | 8 | 4 |
| Measles* | 13,337 | 656 | 255 | 30 | 194 | 1,583 | 372 | 292 | 60 | 1 |
| Deaths | 25 | — | 2 | | 3 | 2 | 1 | 4 | 2 | — |
| Ophthalmia neonatorum | 67 | 3 | 8 | 1 | — | 59 | 1 | 17 | — | — |
| Deaths | | | | | | | | | | |
| Paratyphoid fever | — | — | — | — | — | 23 | — | 1 (B) | — | 1 (B) |
| Deaths | — | — | — | | — | — | — | — | — | — |
| Pneumonia, influenzal | 981 | 54 | 22 | 15 | 8 | 860 | 59 | 31 | 37 | 3 |
| Deaths (from influenza)† | 121 | 32 | 6 | 2 | 1 | 123 | 14 | 12 | 3 | 1 |
| Pneumonia, primary | | | 277 | 21 | | | | 307 | 39 | |
| Deaths | | 92 | | | 18 | | 46 | | 16 | 15 |
| Polio-encephalitis, acute | 2 | — | | | | 1 | — | | | |
| Deaths | | — | | | | | — | | | |
| Poliomyelitis, acute | 8 | — | 2 | 4 | — | 7 | — | 1 | 1 | — |
| Deaths | | — | | | | | — | | | |
| Puerperal fever | | 1 | 11 | | — | | — | 10 | | — |
| Deaths | | | | | | | | | | |
| Puerperal pyrexia‡ | 109 | 12 | 8 | 1 | 4 | 126 | 4 | 12 | 3 | — |
| Deaths | | — | | | | | — | | | |
| Relapsing fever | — | — | | | — | — | — | | | — |
| Deaths | | | | | | | | | | |
| Scarlet fever | 1,167 | 84 | 228 | 30 | 38 | 1,232 | 86 | 176 | 22 | 29 |
| Deaths | 2 | — | — | | — | 2 | — | — | — | — |
| Smallpox | 5 | — | — | — | — | 8 | — | — | — | — |
| Deaths | | | | | — | | | | — | — |
| Typhoid fever | 5 | — | — | — | — | 8 | — | 2 | 8 | — |
| Deaths | — | — | — | | — | — | — | — | — | — |
| Typhus fever | — | — | — | — | — | — | — | — | — | — |
| Deaths | | | | | — | | | | — | — |
| Whooping-cough* | 2,290 | 224 | 384 | 86 | 21 | 1,605 | 142 | 69 | 38 | 11 |
| Deaths | 1 | — | 4 | 10 | — | 13 | — | — | 2 | 1 |
| Deaths (0–1 year) | 627 | 83 | 99 | 70 | 15 | 398 | 48 | 73 | 42 | 29 |
| Infant mortality rate (per 1,000 live births) | | | | | | | | | | |
| Deaths (excluding still-births) | 8,352 | 1412 | 917 | 403 | 182 | 5,556 | 886 | 685 | 247 | 157 |
| Annual death rate (per 1,000 persons living) | | | 19·1 | | | | | 15·1 | 15·8 | |
| Live births | 10,520 | 1706 | 1219 | 501 | 304 | 7,487 | 1032 | 945 | 396 | 273 |
| Annual rate per 1,000 persons living | | | 24·6 | | | | | 19·0 | 25·4 | |
| Stillbirths | 300 | 42 | 43 | | | 216 | 32 | 30 | | |
| Rate per 1,000 total births (including stillborn) | | | 34 | | | | | 31 | | |

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

† Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

‡ Includes puerperal fever for England and Wales and Eire.

Returns of births and deaths for Eire from week ended Oct. 26 to week ended Feb. 22 appear on p. 400.

## EPIDEMIOLOGICAL NOTES

### Neonatal Diarrhoea in Derby

At Derby City Hospital 2 premature infants, five days old, developed diarrhoea on Feb. 20. Further infants were affected on Feb. 23, 24 (2), and 26 (2), and on March 1, 2, 4 (3), and 8—a total of 13 cases. There were 6 premature infants and of these 4 died and the two others were seriously ill but are recovering; 2 out of 7 full-term infants have died. Clinically there was a period of one to two days of lethargy, anorexia, and loss of weight, followed by the sudden onset of fever (100°–103° F.: 37.8°–39.4° C.), and watery diarrhoea. The colour of the stools varied from cream to green; orange stools were seen but were unusual. Dehydration followed and death occurred in most cases about the fourth day. Recovery with fall of temperature and the gradual return of the stools to normal took place usually towards the end of the first week in the milder cases.

The first 4 affected infants were delivered in the same labour ward within twenty-six hours on Feb. 15 and 16. They were distributed to the three maternity wards and later became the first cases in each ward. Subsequent cases may well have been infected from the primary cases owing to overcrowding and lack of staff. The maternity department was dealing with about double the pre-war number of admissions. There was no case of diarrhoea among the infants in the preceding six weeks. None of the affected infants had been wholly breast-fed. The onset in 4 cases followed the institution of artificial feeding, breast-feeding having failed. No mother appears to have been affected. One nurse did suffer from diarrhoea, but on clinical grounds it seemed unlikely that she had any connexion with the outbreak. The steps taken to check the outbreak included closing the affected ward to new admissions, the discharge of healthy mothers and infants as soon as possible, the isolation of all proven and suspected cases, spacing the remaining healthy patients as widely as possible, and vigorous overhaul of nursing technique with emphasis on the importance of breast-feeding without supplement.

Since March 9 one infant affected on Feb. 24 has died, and there have been 2 further return cases, one fatal. It seems probable that a few more cases will appear before the outbreak is finally controlled.

### Discussion of Table

In *England and Wales* an increase was recorded in the notifications of scarlet fever 86 and whooping-cough 63, with a decrease in the incidence of measles 2,428, acute pneumonia 158, and diphtheria 31.

The changes in the local trends of scarlet fever and whooping-cough were small and no large variations occurred. A small decrease in the incidence of diphtheria was recorded throughout the country; 28% of all cases were notified in Lancashire.

The fall in cases of measles was mainly confined to the northern sections. The largest variations in the local returns were decreases in Lancashire 789, Warwickshire 371, Yorkshire West Riding 208, Middlesex 196, Northumberland 154, and Durham 133. There were increases in Surrey 106, Essex 101, and Southampton 86.

No further cases were reported from the outbreak of dysentery in Hertfordshire, St. Albans R.D. Two new outbreaks were reported during the week: Middlesex, Southall M.B. 13 and Suffolk, Newmarket U.D. 10.

The one case of smallpox diagnosed in Stepney, London, is linked to the outbreak in Grimsby, where 14 cases with 6 deaths have been reported.

In *Scotland* no further cases of dysentery were reported from Banff county, and the notifications for the whole country dropped to 16. With the exception of measles, which fell by 45, the notifications of other diseases underwent little change.

In *Eire* the incidence of whooping-cough declined by 22, but a fresh outbreak with 16 cases was notified in Westmeath, Coole R.D. Notifications of diarrhoea and enteritis increased by 20.

In *Northern Ireland* the outbreak of measles in Belfast C.B. continued to decline, and 194 cases were notified during the week, a fall of 93.

### Week Ending March 8

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,217, whooping-cough 2,461, diphtheria 182, measles 12,137, acute pneumonia 958, cerebrospinal fever 86, dysentery 69, acute poliomyelitis 10, smallpox 7, paratyphoid 4, typhoid 4. Deaths from influenza in the 126 great towns numbered 92.

### Births and Deaths in Eire

The following table shows the figures for the 13 principal towns in Eire each week from the week ended Oct. 26, 1946, to the week ended Feb. 22, 1947. During this period there were no deaths due to dysentery, scarlet fever, smallpox, or typhus.

| Week ended : | Births | Deaths | | Deaths Caused by | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | All Ages | Under 1 Year | Diphtheria | Diarrhoea and Enteritis (Under 2 Years) | Measles | Influenza | Typhoid Fever | Whooping-cough |
| Oct. 26, 1946 | 324 | 168 | 19 | 2 | 3 | | | | |
| Nov. 2 | 333 | 189 | 28 | | 8 | | | | |
| Nov. 9 | 350 | 175 | 23 | 1 | 8 | | | | |
| Nov. 16 | 336 | 167 | 19 | | 7 | | 1 | | |
| Nov. 23 | 328 | 183 | 30 | | 16 | | | | |
| Nov. 30 | 402 | 198 | 41 | 1 | 9 | | 1 | 1 | 2 |
| Dec. 7 | 462 | 216 | 45 | | 13 | 1 | | | |
| Dec. 14 | 416 | 249 | 53 | 3 | 17 | 1 | | | |
| Dec. 21 | 389 | 184 | 34 | 1 | 11 | | 2 | | |
| Dec. 28 | 207 | 202 | 23 | | 3 | | 1 | | 1 |
| Jan. 4, 1947 | 510 | 297 | 49 | | 16 | | 1 | | 3 |
| Jan. 11 | 467 | 290 | 55 | | 13 | | 1 | | 2 |
| Jan. 18 | 404 | 277 | 39 | | 8 | | | | 1 |
| Jan. 25 | 356 | 263 | 41 | 1 | 9 | | 1 | | 2 |
| Feb. 1 | 376 | 326 | 42 | | 11 | | 12 | | 3 |
| Feb. 8 | 361 | 408 | 44 | 1 | 2 | | 4 | | 7 |
| Feb. 15 | 481 | 366 | 47 | | 10 | | 7 | | 3 |
| Feb. 22 | 397 | 398 | 49 | | 5 | | 4 | | 4 |

### Births and Deaths in the United States

The provisional report for 1946 puts the birth rate at 23.3 per 1,000, which is 8% higher than the wartime peak of 1943. The birth rate in 1943 was the highest recorded since 1924. The infant mortality was 36.1 per 1,000 live births, and was 1.4 below the rate for 1945. The general death rate was 10.1 per 1,000 compared with 10.6 in 1945.

## Medical News

Lord Horder, who is Chairman of the Standing Committee on Nutrition of the Food and Agriculture Organization of the United Nations, left for Washington on March 15 and will be away until April 14.

A Clinico-Pathological Meeting of the West London Medico-Chirurgical Society will be held at the West London Hospital to-day (Friday, March 21) at 8.45 p.m.

Dr. J. A. V. Butler will deliver the last of his three Cantor Lectures on "Enzymes: Their Isolation, Structure, Mode of Action, and Place in Nature" before the Royal Society of Arts (John Adam Street, Adelphi, W.C.) on Monday, March 24, at 5 p.m. The first two lectures were given on March 10 and 17, and all three will appear in the Society's *Journal* in due course.

A meeting of the Nutrition Panel of the Society of Chemical Industry will be held at the Chemical Society's rooms (Burlington House, Piccadilly, W.) on Wednesday, March 26, at 6.30 p.m., when Dr. Kenneth Mellanby will read a paper on "Human Water Requirements." A discussion will follow. All members of the Food Group are invited to attend the meeting.

A meeting of the Medico-Legal Society will be held at 26, Portland Place, W., on Thursday, March 27, at 8.15 p.m., when a paper by Drs. Charles E. Newman and Ronald H. Graveson on "The Education and Status of the Medical and Legal Professions" will be read.

The annual meeting of the Mental After Care Association will be held at Burlington House, Piccadilly, W., on Thursday, March 27, at 3 p.m., when Dr. Henry Yellowlees and others will speak on the work of the association. All interested are invited to attend the meeting.

The first course for resettling Polish pharmacists under the Bill sponsored by the Government has opened at the Brighton School of Pharmacy. About sixty of those who can pass an examination like the one for foreign pharmacists under the Defence Regulations are to be temporarily registered here.

The Harveian Society of London announces that the Buckston Browne Prize for 1946 has been awarded to Michael Kelly, M.D., University of Melbourne, for his essay on "The Pathology and Treatment of Fibrositis."

## Any Questions?

*Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.*

### Diphtheria Immunization

**Q.**—*Should diphtheria immunization in children be repeated in all cases after five years?*

**A.**—If a child receives its first course of artificial immunization at the age of 9 months to 1 year the resulting immunity will begin to wane after a few months, and two years later may have fallen to a very low level. Such a child, if exposed to the risk of infection, may develop diphtheria which will not usually be severe since the diphtheria toxin will stimulate the sensitized antibody-producing cells into activity, and in a few days' time enough antitoxin will have been formed to neutralize the toxin. The usual practice in this country is to give a child its first boosting dose at 5 years of age when it goes to school, but in an area where diphtheria is still prevalent it might be wiser to give this dose at 3 years of age. The effect of the boosting dose is to raise the antibodies to a high level, and as a rule the fall in antibody titre takes place much more slowly than it does after the first immunization. Further, when the child goes to school and mixes freely with other children it may be exposed to small doses of diphtheria bacilli, which will help to maintain immunity. Alternatively the child may be given a second boosting dose of diphtheria prophylactic around the age of 10 years.

### Diphtheritic Tonsillitis

**Q.**—*Should cases of diphtheritic tonsillitis be treated as diphtheria in infectious diseases hospitals, or should they be treated at home as tonsillitis, as their clinical course is invariably mild?*

**A.**—Throat infection with *C. diphtheriae* in those who have been artificially immunized or have acquired some natural immunity often presents a clinical picture of follicular tonsillitis with a patchy exudate that can easily be wiped off, and a more acute inflammatory reaction with a higher temperature than is usual with typical faucial diphtheria. As a rule these patients have little or no toxaemia, and the infection may be called "diphtheritic tonsillitis." It is almost invariably associated with either *gravis* or *intermedius* types of *C. diphtheriae*, which have a greater capacity for tissue invasion than has the *mitis* type and may therefore produce a local throat infection in those who have some antitoxic immunity. Although the clinical course is usually mild, post-diphtheritic paralysis does sometimes occur, and in the more severe infections antitoxin should certainly be given. However, the important point is that the patients are a potential danger to family or other close contacts and should therefore be isolated: at home if the conditions are suitable, or, if not, in hospital. Practitioners should keep a sharp look out for this type of infection and obtain a bacteriological diagnosis whenever possible.

### Diphtheria Treatment without Antitoxins

**Q.**—*Supposing that diphtheria antitoxin were not available, how should one treat a case of diphtheria?*

**A.**—It is difficult to visualize circumstances where diphtheria antitoxin will not be available for the treatment of diphtheria. If the questioner has in mind an island or some outlandish place far from a hospital, the answer surely is that the prudent doctor will always carry antitoxin with him. Antitoxin is available free from the medical officer of health, and kept even at room temperature retains most of its potency for some months. Moreover, the present refined enzyme-digested antitoxin is so concentrated that an adequate dose for an early case may be contained in 1 to 2 ml., while the risk of serum reaction or anaphylaxis is minimal. There is no alternative treatment to antitoxin, although many patients with mild or moderate infections will doubtless recover without it, as happened in the pre-antitoxin days. Penicillin or other chemotherapeutic drugs may

destroy the organism but will not neutralize toxin that has already been produced. If diphtheria were an acute infection that could be diagnosed easily within twenty-four hours of onset penicillin therapy might be considered as a substitute for antitoxin, but unfortunately diphtheria is too often an insidious disease and a considerable amount of toxin has been formed, with damage to vital tisues, before the infection is diagnosed.

### Sex Predetermination

**Q.**—*I saw recently a report that a programme of research could be laid down which, over a short period of years, would allow sex to be predetermined. Is it possible to indicate briefly what work is being pursued; what would be the type of research still to be undertaken; and what are the most recent authoritative papers on this subject?*

**A.**—There are two kinds of spermatozoa, distinguished one from the other in respect of their sex-chromosome content. One is male-determining and the other female-determining. To predetermine the sex of the child about to be conceived will therefore become possible when the two different kinds of spermatozoa can be separated one from the other in the ejaculate, that part containing one or the other kind being introduced into the female about the time of ovulation by the techniques of artificial insemination. Recent experimental work in this field has taken the form of so altering the chemical atmosphere of the vagina of the female by the application of lactic acid or, alternatively, of sodium bicarbonate that one form of spermatozoa is advantaged in its journeying towards the ovum. The results of such experimental work are not convincing, but the methods employed indicate the kind of investigations that need to be undertaken.

It is eminently possible that a team of biologists, biophysicists, and biochemists adequate in numbers, interest, and knowledge could within a reasonable time elaborate techniques which would disclose knowledge yielding the power necessary for the separation of the two forms of spermatozoa. Such power could certainly be used with great advantage in the agricultural field—in the dairy industry, for example. In the case of the human subject any biological invention endows a human society with knowledge which in application can yield either human amelioration or distress and degradation. The power to predetermine sex in this way, misused by the irresponsible or by the tyrant, could seriously disturb the terrestrial destiny of mankind. The subject is extensively reviewed in the new edition of F. H. A. Marshall's *Physiology of Reproduction*, which is shortly to be published. (See also *Journal*, Aug. 10, 1946, p. 216.)

### Sensitivity to Hair Dyes

**Q.**—*A patient of mine had dermatitis of the scalp thought to be due to the application of a hair dye. Does this happen often? What factor in hair dyes is responsible, and what is the usual character of the dermatitis? In this case there was severe oedema and desquamation.*

**A.**—Certain types of hair dyes generally contain para- or meta-phenylenediamine, or both, or some allied chemical. There is probably an incidence in the general population of idiosyncrasy towards such chemicals of about 4%. Such individuals may react to a first application of the dye by an acute contact dermatitis, with redness and oedema, sometimes weeping, and scaling and scabbing of the head and face. This may extend further by direct spread or from absorption through the blood stream. Other individuals may develop sensitiveness after a number of applications. Tests to ascertain whether the patient is sensitive or not are not very satisfactory, and reactions may not occur for twenty-four days or longer after the tests. The response to treatment is naturally variable, depending on the patient, on the circumstances, and on possible complications.

R. M. B. MacKenna (*Journal*, 1930, **1**, 899) discusses para-phenylenediamine dyes, and he suggests that on oxidation they give rise to quinone-di-imine and water; Bandowsky's base, which has caused dermatitis in people wearing furs dyed with it, is a substituted quinone-di-imine. MacKenna describes the toxic effects of para-phenylenediamine as being local and general. Locally there may be acute erythematous dermatitis of the scalp, face, and neck, with oedema. There may also be headache, nausea, vomiting, diarrhoea, fever, and in acute cases albuminuria. Other easily consulted papers are by Percival (*Lancet*, 1931, **2**, 417), H. W. Nott (*Journal*, 1924, **1**, 421), A. Gautier (Ibid., 1909, **2**, 812), and W. J. Close (*Austral. Med. J.*, 1932, **1**, 53). Generally speaking, some persons are susceptible to the toxic action while others, the large majority, are not. Susceptible cases are likely to suffer mildly or severely, though severe reactions are of course much rarer than mild ones.

### Housewife's Dermatitis

**Q.**—*Many housewives' hands show signs of dermatitis with dryness and hardness of the palms and a tendency to fissuring of the skin at the nail margins. It is useless to tell these women to keep their hands out of soap and water, and rubber gloves are in short supply. I have tried lanolin and glycerin as local applications but without much success. Is there any better treatment?*

**A.**—It is essential to impress upon patients that the control of household dermatitis depends ultimately upon their co-operation in the matter of avoiding contact with wet alkaline irritants. When immersion is unavoidable, care should be taken to rinse the alkali from the hands, to dry them thoroughly, and to dress with one of the following emollients:

℞
Eucerin. .. .. .. .. .. ʒiv (15 g.)
Aq. rosae .. .. .. .. .. ad ʒj (28.3 g.)
Ft. crem.

℞
Calamin. .. .. .. .. .. gr. xl (2.7 g.)
Lanolin. .. .. .. .. .. gr. xxx (2 g.)
Ol. oliv. .. .. .. .. .. ʒiv (15 g.)
Paraff. moll. .. .. .. .. .. ad ʒj (28.3 g.)
Ft. crem.

℞
Acid. boric. .. .. .. .. .. gr. xx (1.3 g.)
Acid. salicyl. .. .. .. .. .. gr. x (0.65 g.)
Zinc. oxid. .. .. .. .. } āā gr. lx (4 g.)
Amylum .. .. .. .. }
Paraff. moll. .. .. .. .. .. ad ʒj (28.3 g.)
Ft. crem.

It is necessary first to clear the dermatitis, and for this fractional doses of *x* rays, Lassar's paste (with or without tar), and sedative–tonic measures internally should be employed. Sometimes creams with unsaturated fatty acids (e.g., linoleic) are helpful. It must be stressed that most of these patients are eczema-prone and that a disturbance of physical or nervous health is present and requires attention. Rubber gloves, if obtainable, are sometimes troublesome to such patients, but if the dermatitis has been cleared appropriate barrier creams may help in protecting the hands from household irritants. It should be noted that household dermatitis affects chiefly the backs of the fingers and hands and finger clefts. The palms are more often affected in constitutional eczema.

### Pregnanediol Test for Pregnancy

**Q.**—*What is the technique of the pregnanediol excretion test for pregnancy and threatened abortion?*

**A.**—The pregnanediol test for pregnancy is based on the fact that this excretion product of progesterone appears in the urine in greater quantities during pregnancy than in most other circumstances. Threatened abortion is presumably sometimes due to a progesterone deficiency, and a low excretion level of pregnanediol in such cases is therefore an indication for progesterone therapy, whereas if the excretion is up to average another cause for the abortion should be sought. A gravimetric method of assay of pregnanediol, which is extracted from the urine in the form of sodium pregnanediol glucuronidate, was described by Venning (*J. biol. Chem.*, 1937, **119**, 473) and has been used by many workers, including Hain and Robertson (*Lancet*, 1939, **1**, 1324) in this country, as a means of diagnosing pregnancy. The references should be consulted for details of the method, which is complicated and laborious, requiring a litre of a twenty-four-hour specimen of urine and taking three days to complete. A few years later Guterman (*J. clin. Endocrinol.*, 1944, **4**, 262; 1945, **5**, 407) described the test which bears his name. It is carried out on 100 ml. of a first morning specimen of urine, and after a more simple

extraction process a rough assay of the pregnanediol content is made by noting the colour which develops on the addition of concentrated sulphuric acid. It is economical and requires only three hours to complete, but it is less accurate and reliable and is suitable only for crude quantitative work unless a spectrophotometer is employed. The technical details are to be found in Guterman's papers, and in a recent article by McCormack (*Amer. J. Obstet. Gynec.*, 1946, **51**, 722). The special value of the test in cases of threatened abortion is dealt with by Guterman (*J. Amer. med. Ass.*, 1946, **131**, 378).

### Lymphoedema of the Legs

**Q.**—*A woman aged 38 has a history of swollen legs since she was 15. The oedema pits, and the left leg is worse than the right. A sister has had a similar complaint since the same age, but three other sisters are normal. Does thus rule out Milroy's disease and, if so, what is the cause of this condition?*

**Q.**—*A young woman of 25 has swollen legs which pit only slightly. None of the usual causes of oedema can be elicited and correction of pes planus has not been effective. Can you suggest diagnosis, prognosis, and treatment?*

**Q.**—*A young woman aged 32 complains of intermittent swelling in the ankles, affecting the anterior aspect of the joints, which began four years ago. It is worse on the right side, and is accompanied by a dull ache relieved by resting. Some subcutaneous thickening is present. Urine, heart, and veins are normal. She has carried out foot exercises, but without result. Suggestions as to cause and treatment would be welcomed.*

**A.**—All these are cases of lymphoedema, due to thrombosis of the lymphatics—probably the result of an infective lymphangitis, which in most cases, but not in all, passes unnoticed by the patient. Tinea of the toe clefts is blamed by some, and this should always be looked for and treated thoroughly. The disease is 99% a female one, and this is held by some to be in line with the greater incidence of venous thrombosis in the female; by others it is attributed to the difference in the clothing protection of the legs in the two sexes. A few cases are due to pelvic disease, and this should be looked for in every case. The prognosis is very variable. The worst cases go on to elephantiasis; in the mildest the oedema remains a minor nuisance and confined to one leg. The treatment in all cases is the same—sleeping on an inclined bed to drain the legs at night, and wearing by day a support adequate to control the oedema. In very advanced cases operations of the Kondoleon type are indicated.

## INCOME TAX

*All inquiries will receive an authoritative reply but only a selection can be published.*

### Schedule E Liability—Expenses

G. receives a mileage allowance for the use of a car which is essential for his work. The allowance is considered insufficient for the partial use of the car for such purposes. Can he claim for the excess? The maid who is kept for domestic reasons often takes telephone calls arising from his work; can anything be claimed for the cost of the maid?

*** G. can claim for the excess of the cost over the mileage allowance, and in doing so can include depreciation allowances or the cost of renewal of the car. It should be understood, however, that it is only the *necessary* cost that is allowable—or rather the proportion of that cost as compared with the total, private and official, use of the car—and that where a special expenditure such as a renewal of the car is incurred, the Revenue may contend that it should be spread over, say, three or four years.

As regards the telephone calls, the circumstances seem to be such that the proportion of the maid's time spent in answering calls is so small as to render such a claim valueless.

There is no publication giving general advice to medical men which is now available.

### Examination Fees

J. E. inquires whether any relief can be claimed for examination fees.

*** No. They are in the nature of capital outlay, and are not regarded as expenses incurred in carrying out the duties of an appointment.

# Letters and Notes

### Nocturnal Diuresis

Dr. N. J. W. THOMPSON (St. Helens) writes: I read with interest the letters from Dr. B. E. Read (Jan. 25, p. 168) and Dr. S. D. Sturton (Feb. 15, p. 283) on the subject of nocturnal diuresis among prisoners of war and internees in the Far East. I was a prisoner of war in Nagasaki, No. 14 Camp, where also nocturnal frequency was a very common complaint.

I am not prepared to surmise as to how much the condition was due to a rice diet *per se* or to nervous strain, but in my opinion an important causative factor was a large fluid intake in the diet. The latter consisted mainly of a cereal (rice, barley, and millet). The cereal was cooked by soaking in water and steaming. During this process, it swelled to more than three times its original bulk, so that it contained at least 70% water. In addition a bowl of soup was provided consisting almost entirely of coloured water. After consuming the above evening meal most of the men still felt the pains of hunger. To alleviate this, and contrary to medical advice, they were in the habit of drinking large quantities of tepid water under the impression that by filling up with something they would feel better. I estimate that many had a fluid intake of more than 3 to 4 pints (1.7–2.3 litres) after 7 p.m. It is little wonder that they had nocturnal frequency.

### Dermatitis Herpetiformis

Dr. R. MILTON (Haslemere) writes: Referring to the inquiry under "Any Questions?" (Feb. 15, p. 281) on the treatment of dermatitis herpetiformis, your correspondent may care to try "benadryl" capsules. One recent case (male, aged 62), previously controlled by arsenic, suffered a relapse after withdrawal of this drug due to hyperkeratosis and colitis. This relapse was adequately cleared up by the use of "benadryl" capsules 50 mg., 1 t.d.s. This dose had to be reduced to one capsule twice daily owing to tiredness. He has been nearly free of symptoms and has continued the drug for the past five or six months. It would seem therefore that "benadryl" is purely symptomatic in its effect, and I would like to know what contraindications there are for its continued use.

Dr. T. H. K. MACLAUGHLIN (Leicester) writes: Having suffered from this distressing complaint myself may I suggest that before resorting to any severe treatment the following be given a trial.

(1) Ung. atropinae, *B.P.C.*, 1 dr. (4 g.) Ung. glycerin. plumb. subacet. 1 oz. (30 g.).

(2) Tab. phenobarb. 1 gr. (65 mg.) unam nocte.

This was the only treatment which afforded me any relief over 20 years ago, and I have had no recurrence.

### Treatment of Post-operative Thrombo-phlebitis

Mr. HAROLD DODD (London, W.) writes: May I suggest another treatment alternative to that recommended in "Any Questions?" (Feb. 8, p. 243)? It is: (1) The early ligature and division of the femoral vein above the thrombosis with injection of a carbolic acid sclerosant into the lower segment. (2) The administration of dicoumarol orally. (3) Getting patients up for toilet, meals, and bed-making. (4) The application of pads of wool and elastic bandages from the toes to the groins. If after this there is still pain, then more wool and another bandage is put on over these. A further part of the remedy is that of prevention, as by placing a pillow under the patient's knees during the operation; this raises the calves off the hard table, the pressure of which encourages thrombosis in the veins of the posterior tibial muscles. Shortly after recovery from the anaesthetic patients are sat up with the legs over the side of the bed, and 24 hours later they sit out of bed on to a hard chair morning and evening. The practice of treatment in bed for 4–8 weeks for phlebitis can safely be superseded by firm bandaging, getting about, and doing their lighter usual duties. Septic foci, especially apical dental sepsis and cholecystitis, are always watched for in phlebitis and before operations.

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